ENGINEERING NEWS-RECORD

FEB. 25, 1960

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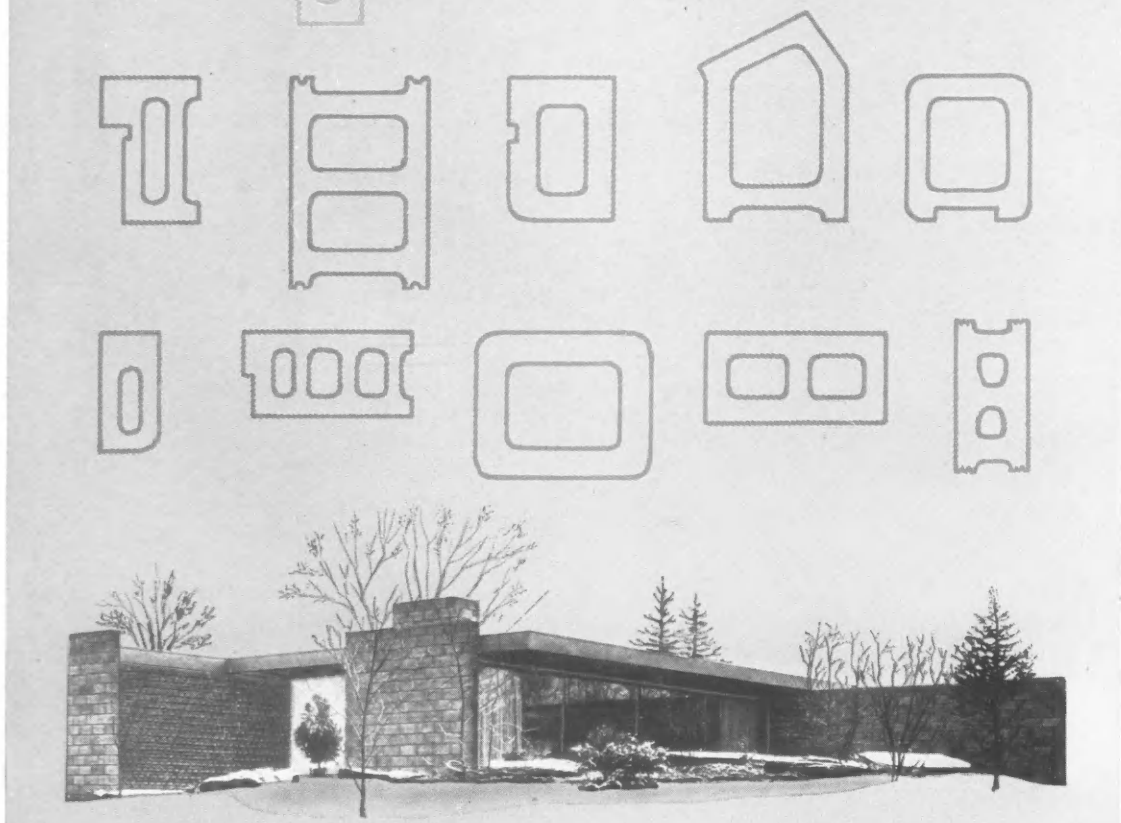

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EIGHTY-SIXTH YEAR OF PUBLICATION

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CONTRACTOR: Vitelli & Son, Contractor, East Detroit, Michigan.

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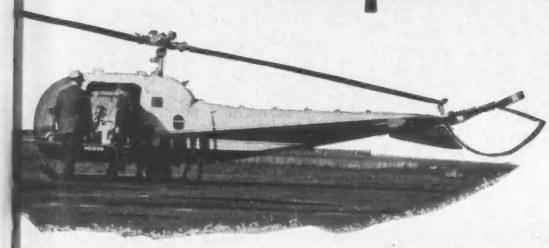
B.F.Goodrich

Copter hop over the new Niagara



Ride in the Bell Ranger and see how B.F.Goodrich tires help build the world's mightiest power project

SOON THE CHURNING WATERS of the Niagara River will be generating more electrical power than ever—over two million kilowatts, enough to light a city the size of Chicago.

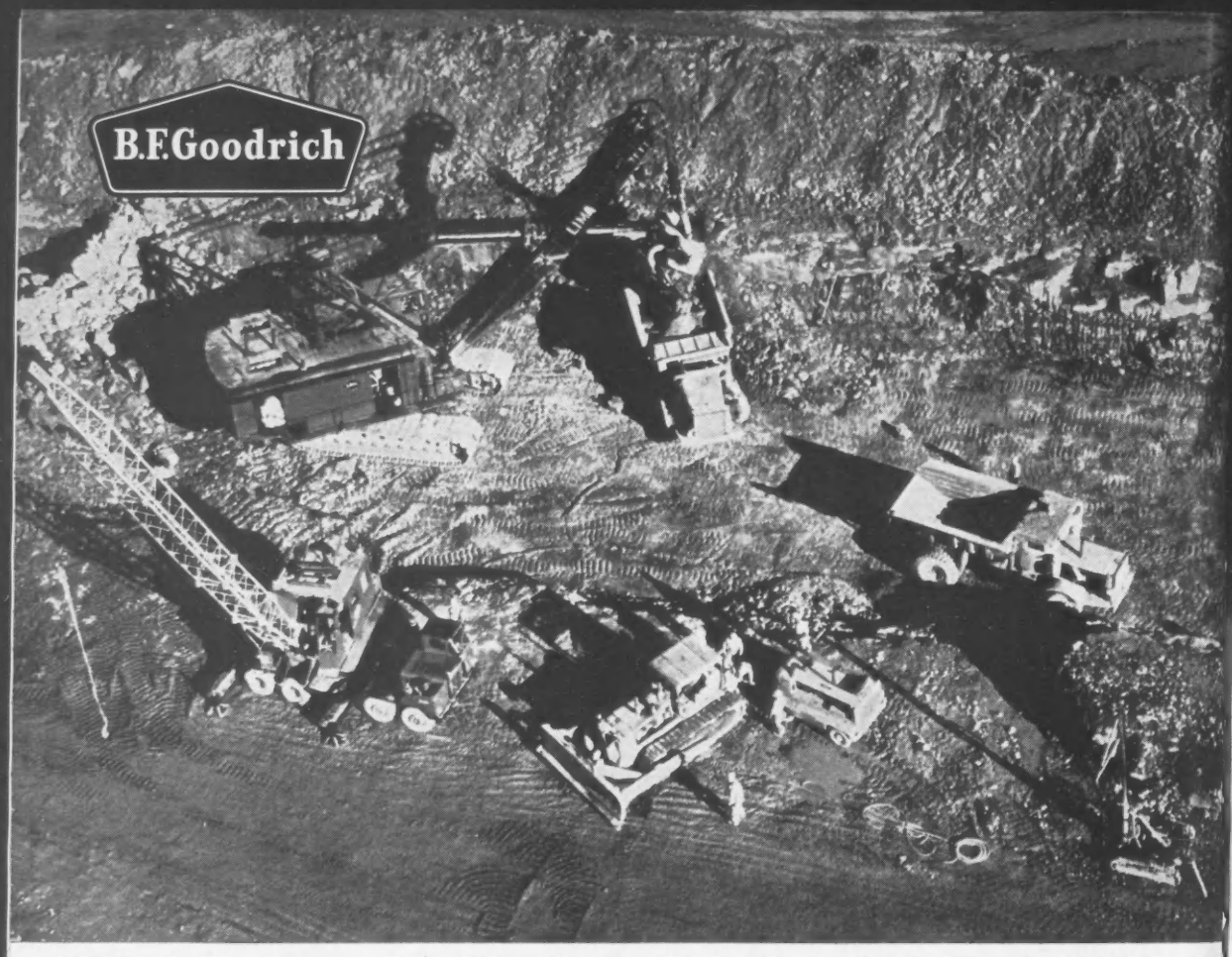
More electricity at lower cost is what we'll get from the $720-million Niagara Power Project, one of the biggest peace-time construction jobs in our history.

Already trucks and other earth-movers have shouldered their loads more than 800,000 times—enough trips to take them ten times around the world.

To cope with the challenges of this and other tasks, Merritt-Chapman & Scott Corporation, largest contractor on the project, uses B.F.Goodrich tires and other products.

NOW WE'RE AT 3,000 FEET. Below us is the entire Niagara Project. At the upper right are the Falls. At upper left, 2½ miles above the Falls, is the Intake Area. Here water will be diverted from the Niagara River into 2 giant covered conduits, each of which is as wide as a 4-lane highway and 5 times higher than the Holland Tunnel. These conduits take the water into the vast Storage Reservoir. From there it moves to the new Niagara Generating Plant, where it plummets down to drive 13 generators. Turn the page and learn how this mammoth job is progressing with the aid of B.F.Goodrich tires.

This B.F.Goodrich report continues ▶



SWOOPING DOWN we come over the conduit area that will carry water from the Niagara River to the new reservoir. Excavations for the 46′-wide covered conduits are 110′ x 50′. The trucks below us, hauling away rocks, are equipped with B.F.Goodrich tires. Altogether, more than 2100 B.F.Goodrich tires—on dump trucks, loaders, graders and other equipment—work 'round the clock, six days a week, rolling over rock-strewn Niagara excavation sites.

See how 2100 B.F.Goodrich tires a

B.F.GOODRICH ROCK SERVICE TIRES have run up amazing service records at Niagara—over 5,000 hours in some cases! The new B.F.Goodrich Cut Protected tread compound is outstandingly successful at withstanding cutting and chipping from abrasive Niagara rock. Massive double-chevron Rock Service cleats give extra traction in forward or reverse. And because of the B.F.Goodrich Flex-Rite Nylon cord body, Rock Service tires are almost immune to heat blowouts and flex breaks. Result: you get more original-tread hours of service, more retreadable tires.

TO GIVE CONTRACTORS what they need *when* they need it, B.F.Goodrich built a warehouse near the Niagara project. A complete line of B.F.Goodrich tires is stored, ready for every emergency. At the B.F.Goodrich Tire Service Building on the job site, a crew of trained tire maintenance men works in shifts, 'round the clock.

IT'S AN EMERGENCY, and the B.F.Goodrich Tire Service Man is there. He's trained to handle any type tire on any type equipment. He has at his disposal all the latest power tools, such as hydraulic cranes, pneumatic wrenches, bead jacks. Background: 13 penstocks at Niagara Generating Plant will direct torrents of water into giant turbines. Penstocks are 462 feet long.

are helping men harness Niagara

From the beginning of work on the Niagara Power Project, B.F.Goodrich on-the-scene specialists have helped determine exactly the right B.F.Goodrich product for each particular job. In addition to Rock Service tires (now available in the new Cut Protected compound), B.F.Goodrich Rock Logger, Tractor Grader, All-Purpose, Mud-Snow and Power Express tires are at work.

B.F.Goodrich hose feeds air to machines drilling dynamite holes. B.F.Goodrich rain suits, gloves and footwear protect hundreds of construction workers.

B.F.Goodrich conveyor belts will carry materials for 1,300,000 cubic yards of concrete, total required for the entire generating plant. And helping to keep the whole project humming are special B.F.Goodrich maintenance and service facilities—all part of the new B.F.Goodrich Unified Contractor Program.

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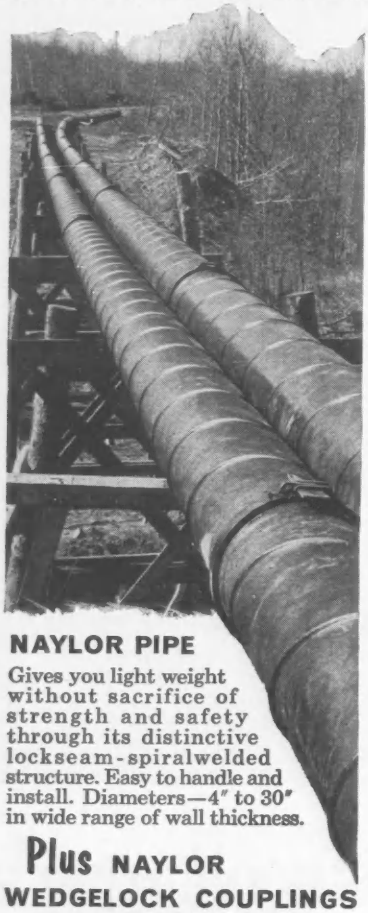

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Reader Comment

Highway User Should Pay

SIR—There is mounting feeling that highway construction should be tailored to the willingness and the ability of highway users to bear the cost. This feeling is so completely equitable, so absolutely in line with American free-enterprise concepts, that it is difficult to believe that anyone would be in disagreement. However, in the January 21 issue (p. 100), you editorially lament this development, and take to task the astute administrators who are actively working toward this highly desirable situation.

Permit me to respectfully draw your attention to the fact that the principle of the user charge is a fundamental part of our glorious free economy. The fact that the users of any commodity or service must bear the complete cost of that commodity or service is the very essence of competition and genuine progress. Only by means of user charges can the consumer's dollar-vote be made fully meaningful.

It is largely because we have violated this basic facet of our American economic system, and have permitted highways to be financed socialistically, that we have the present overemphasis upon this fundamentally inefficient and inherently uneconomical form of transportation. There can be no question but that demands for continual expansion of the highway system would be much less intense if those who dance were compelled to pay the piper.

Specious arguments involving real or imagined benefits to owners of adjacent property, defense requirements, etc., will be disregarded by an alert Administration. Highways are only one of a great many important facets of our economy, and they bear no special entitlement to socialistic largess.

ALVIN L. SPIVAK
Glendale, Ohio

Amends Impact Formulas

SIR—Thank you for publishing my letter "Impact Loads in Helistop Design," (ENR Nov. 26, 1959, p. 8).

Unfortunately, I detected two important misprints:

1. The expression for internal work, which reads $\frac{1}{2}$ Pa^2, should read $\frac{1}{2}$ P^2 a

2. The expression derived from equation (2) reads $\frac{1}{6}\left(\frac{s}{d}\right)\frac{L}{E}$. This should read $\frac{I}{6}\left(\frac{s}{d}\right)^2\frac{L}{E}$.

A. FLORIS
Los Angeles, Calif.

(*Reader Comment continued p. 12*)

For Your Calendar . . .

National Association of Corrosion Engineers, annual conference. Dallas, Tex. Mar. 15-17. Write: R. W. Huff, National Association of Corrosion Engineers, 1061 M &M Building, Houston 2, Tex.

International Construction Exhibition, Paris, France. Mar. 17-27. Write: Frederic Peter, Commercial Counselor, French Embassy, 610 Fifth Ave., New York 20, N. Y.

Mississippi Valley Conference of State Highway Departments, annual meeting, Edgewater Beach Hotel, Chicago, Ill., Mar. 17-19. Write: Walter Johnson, Mississippi Valley Conference of State Highway Departments, State Highway Commission of Kansas, Topeka, Kan.

Associated General Contractors of America, Inc., annual convention, San Francisco, Calif., Mar. 21-24. Write: William G. Dooly, Associated General Contractors, 20th and E Sts., N. W., Washington 6, D. C.

Electrical Industry Show, Shrine Exposition Hall, Los Angeles, Calif., Mar. 23-26. Write: Fred J. Tabery, Exhibit Manager, 3443 South Hill St., Los Angeles 7, Calif.

American Power Conference, annual meeting, Hotel Sherman, Chicago, Ill., Mar. 29-31. Write: Conference Director R. A. Budenholzer, Mechanical Engineering Dept. Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill.

Uses and Applications of Electronic Computers in the Field of Civil Engineering, University of Wisconsin Extension Division, Wisconsin Center Building, Madison, Wisc., Mar. 31-Apr. 1. Write: Engineering Institute, 3020 Stadium, University Extension, University of Wisconsin, Madison 6.

1960 Nuclear Congress and Atomic Exposition, New York Coliseum, New York, N. Y., Apr. 4-7. Write: Atomic Exposition, 117 South 17th St., Philadelphia 3, Pa.

Building Research Institute, spring conference, Statler-Hilton Hotel, New York, N. Y., Apr. 5-7. Write: Milton C. Coon Jr., BRI executive director, 2101 Constitution Ave., N. W., Washington 25, D. C.

Oil Heat Institute of America, annual convention, Park-Sheraton Hotel, New York, N. Y., Apr. 4-7. Write: Oil Heat Institute of America, Inc., 500 Fifth Ave., New York 36, N. Y.

Malleable Founders Society, market development conference, Edgewater Beach Hotel, Chicago, Ill., Apr. 13-14. Write: Malleable Founders Society, 781 Union Commerce Building, Cleveland 14, Ohio.

American Institute of Architects, annual convention, Mark Hopkins Hotel and Masonic Temple, San Francisco, Calif., Apr. 18-22. Write: American Institute of Architects, 1735 New York Ave., N. W., Washington, D. C.

Church Design and Building Conference and Exposition, Morrison Hotel, Chicago, Ill., Apr. 19-21. Write: Rev. T. V. L. Harvey, 19 South LaSalle St., Chicago 3, Ill.

Third Biological Waste Treatment Conference, Manhattan College, New York, N. Y., Apr. 20-22. Write: Civil Engineering Dept., Manhattan College, New York 71, N. Y.

Southwestern Metal Exposition & Congress, State Fair Park, Automobile Building, Dallas, Tex., Apr. 25-29. Write: Chester L. Wells, Exposition Manager, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

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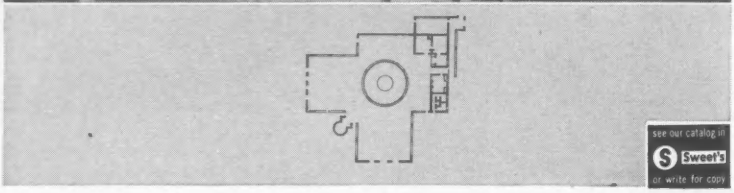
Split-second Speed-o-Matic controls cut operator fatigue—power steer and more usable hp spurt rock output! Nudge a Speed-o-Matic power hydraulic control lever. Feel this brute obey! Trigger-fast shovel reflexes produce up to 25% more cycles per 8-hour shift. And finger-tip Speed-o-Matic power steering gives you double-quick maneuverability in, out, around blast rock, crusher or truck. No sloppy mechanical wear and repair. Payoff: top-profit rock production for *years* . . . at rock-bottom cost. For information on the complete line of shovels and cranes (½- to 3-yd., 8- to 75-ton capacities), see your distributor or write LINK-BELT SPEEDER CORPORATION, Cedar Rapids, Iowa. 101-60-N

LINK-BELT SPEEDER

It's time to compare . . . with Link-Belt Speeder

St. George's Catholic Church, Erie, Pennsylvania. Architects: Nelson, Goldberg and Heidt, Erie. Contractor: H. Platt Company, Erie.

Space provided: cruciform sanctuary with seating capacity of 1,000. *Structural framing:* glulam parabolic arches spaced at 15'-4". *Exterior walls:* brick, stone and art glass. *Interior walls:* oak paneling and exposed brick and stone. *Floors:* maroon and gray slate in aisles; hardened concrete finished green under pews; white marble on elevated chancel and altar. *Lighting:* fluorescent cove lighting with incandescent fixture over the altar. *Heating:* copper radiant heat coils in floor. *Ventilation:* fully air conditioned. *Roof:* copper surface over blonde Tim-Deck. *Volume:* 42,300 cubic feet. *Cost:* $1.23 per cubic foot.



The grand, sweeping scale imparted by parabolic arches of glued laminated timber provides the basis of this inspiring house of worship. Arches and Tim-Deck are finished in a soft green to maintain a pleasant, relaxed atmosphere.

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. . . Reader Comment

Missions to Moscow

SIR—You say in "U. S., Russia to Exchange Construction Men" (ENR Dec. 3, p. 21) that the highway experts aren't the first to go to Russia in the construction field.

In 1930, I was engaged with two other American engineers through the Amtorg Trading Corp. of New York City for services in the Moscow area during the first Five Year Plan. I was the resident engineer with quarters in the head office of Amtorg, residing in one of the early concrete apartment units built by an American contractor.

I think we were the first American highway engineers to go to Russia. Don M. Forester, deputy engineer of the U. S. Bureau of Reclamation, and the late H. Eltinge Breed were members of the party. We designed and supervised the construction of sheet asphalt and asphaltic concrete pavements in the City of Moscow and suburbs.

Our equipment was of American make with the manufacturers supplying skilled operators for the training of the Russian personnel. Our main troubles were inferior material, labor not up to the standard that we have in this country, lack of trained Russian engineers and very little cooperation from the Department of Highways.

JAMES L. KEHOE
Consulting Engineer
Peekskill, N. Y.

Don't Raise the Bridges

SIR—I should like to comment on the bridge height clearance problem on the Interstate Highway Program (ENR Jan. 7, 1960, p. 16).

Since adequate clearance for highway transportation of missiles seems to be the top objective of this expensive new delay, I wish to call attention to the importance of proper design of the transporting vehicle as a means of keeping the load as low as possible. I am sure that special vehicles are required. This might be a way of saving many millions in altering or redesigning grade separation structures. One random thought on this matter is the possible use of the new electric wheels (no axle required) with a cradle between to carry the load as low as feasible.

The other approach is simply to have the missile design engineers keep in mind the desirability of minimum diameters and removable fins.

W. L. MOORE
Atlanta, Georgia

Engineering News-Record welcomes expression of opinions from its readers. Comment should be as brief as possible and pertinent to subjects of current construction importance. Letters should be addressed Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

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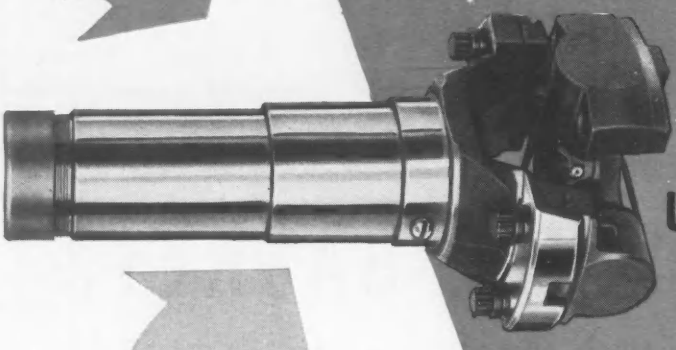

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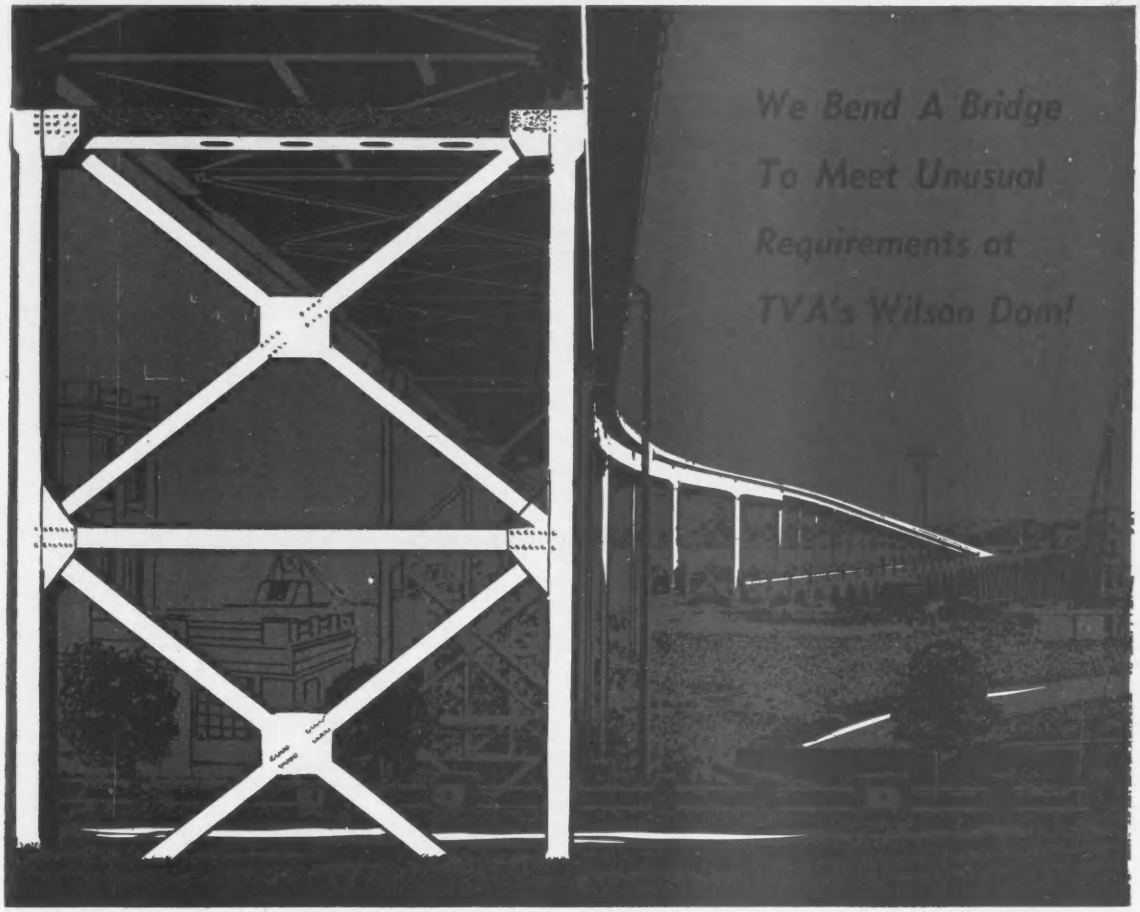

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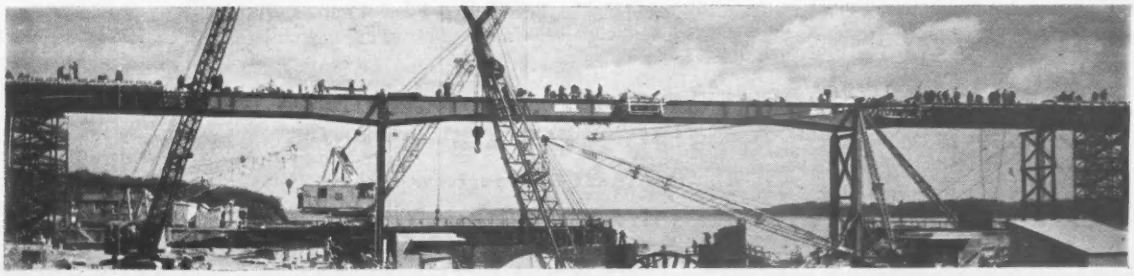

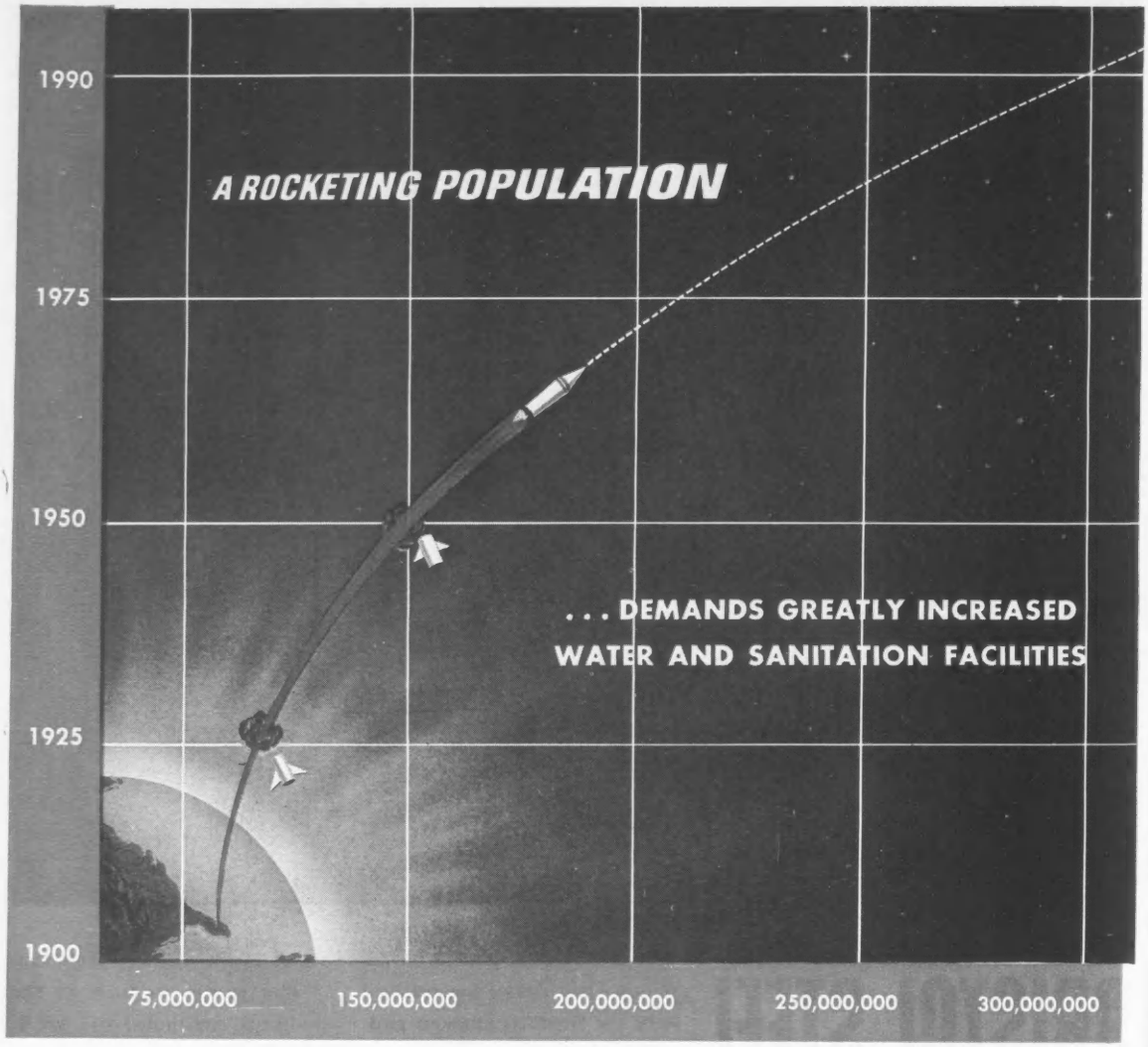

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ENGINEERING NEWS-RECORD

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THE CONSTRUCTION WEEK

NEW JOB FOR THE CORPS—Congress is expected to approve a recommendation by Chief of Engineers Emerson C. Itschner that the Corps of Engineers stake out flood-prone areas. Under the plan the Corps would study flood plains and warn local officials on vulnerability of prospective construction sites. Should flood damage occur after such warning, federal relief would be hard to come by.

LEASE-BACK HIGHWAYS?—Kentucky Gov. Bert D. Combs is considering a solution to a threatened pinch on roadbuilding money that is similar to school-financing. It calls for establishment of a commission or holding company that would sell bonds to build roads and retire the bonds by leasing the roads to the state.

STILL STRONG—The housing spurt continues this week. Private mass housing contracts reported to ENR totaled $129.4 million. Though it includes only four days, it is the biggest week for mass housing since July. And the four-week average of $107 million makes February the best month since June '59—just before mortgage money started to tighten noticeably.

WHERE AIR FORCE DOLLARS WILL GO—Major items in the Air Force's $738-million construction budget are: $298 million for ICBM and satellite launching sites; $26 million to finish the Bomarc program (see p. 23); $17 million for underground shelter for overseas Mace tactical missile sites; $80 million for bomber bases, and $101 million for radar.

SHELTER-SKELTER—Every residential, public, and private structure in New York State will have a bomb-shelter by Jan. 1, 1963, if Gov. Nelson A. Rockefeller gets his way. Cost is estimated at $1.5 billion, which would be paid by property owners.

BLACK TOPPERS GO AUTOMATIC—Two U.S. manufacturers are field testing new electrically controlled bituminous pavers. Automatic machine adjustments are said to be controlled by metal fingers and limit switches in contact with aluminum pipe guides set at precise line and elevation.

WHERE DO YOU GO FOR FUN?—In New York City thousands will live quietly on sites where millions once lived it up boisterously. Jamaica Racetrack will be razed to make way for an $86.4-million housing project. Ebbets Field, one-time home of the Dodgers, will become a $22.3-million housing development. If the city's housing authority gets its way, the Polo Grounds, former Giants ball park, will be the site of a $26-million housing project. And William Zeckendorf's Webb & Knapp will tear down the 5,700-seat Roxy movie theater to make a $10-million addition to the existing Taft Hotel.

Who supports the Winter Olympics?
Well, right now out in Squaw Valley, California, Raymond does... with 324 step-taper piles driven to depths of 40' under the striking Blyth Arena. This 8,500 seat structure is being used as the indoor ice arena and, incidentally, was awarded first prize in Progressive Architecture's 1958 design competition. From coast to coast you'll find many of the country's outstanding structures resting on Raymond foundations.
And if you too would like to help support the Olympics, there's a way. Just send check or money order to U. S. Olympic Committee, Suite 1533, 9 Rockefeller Plaza, N. Y. 20, N. Y. The funds will go for the summer games in Rome, and in this way, you'll be making our team, your team.
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WASHINGTON OBSERVER

- School-aid bills shape up
- Sewerage-aid veto could fail
- Governors plump for road funds
- PR effort to do likewise

● **Legislation on federal aid to school construction is moving fast.** Prospects look better than at any time previously. House Democrats have compromised with the Administration but are still shaping a fairly strong bill.

The Senate passed a bill to grant $917 million a year for two years for construction and teachers' salaries. The House Education Committee has restricted aid to construction (in order to get past the Rules Committee) and cut the figure down to $325 million a year for three years.

As a compromise with the President, it allows the state to decide whether it wants direct grants or federal help in paying off the principal and interest on school bonds. The bond-participation plan is what President Eisenhower has requested.

If the state chooses direct grants it would have to match federal funds 50-50 in the second and third years, but not the first.

● **Democrats think they may be able to override a veto of the bill boosting federal grants for sewage treatment plants.** Congress sent a bill to the White House authorizing $90 million a year, a jump from the $50 million voted in recent years.

The Senate, which passed the bill 67-26, could probably muster the same two-thirds vote again with little trouble. In the House, it would be a narrow squeak. There was no recorded vote this year, but last year a similar bill passed 255-143. If a score or more of the 115 Republicans who voted against it last year have changed their minds, proponents would have the necessary two-thirds. Democrats have been counting noses and think election year pressure just might be enough to swing those few votes.

● **Governors of the states want more federal taxes diverted to the Highway Trust Fund to keep construction going at a higher rate.** They propose putting certain auto excises into the fund, plus an extension of the federal 1-cent gas tax increase that would otherwise expire in June of next year. They hope Congress will do something about boosting the Trust Fund revenues this year. But most observers now think this unlikely.

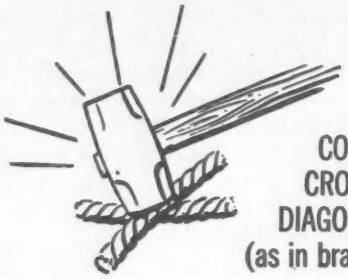
● **The newly organized Better Highways Information Foundation plans to drum up support for more highways around the country.** The organization is backed by such groups as the American Road Builders Association, Associated General Contractors, Construction Industry Manufacturers Association, etc.

The new foundation plans to launch its campaign on a major scale. First year's expenses are estimated at around $250,000. This would be used for advertising and issuing news releases and bulletins.

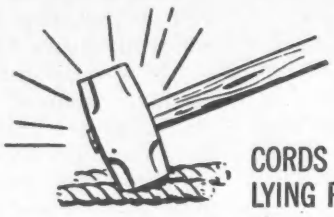
The organization hopes to steer clear of such issues as who should pay how much for the added roads, or how they should be built.

ROYAL CORD AIR HOSE

WHICH HOSE CONSTRUCTION CAN TAKE THE BEATING?



CORDS CROSSED DIAGONALLY? (as in braided hose)



CORDS LYING PARALLEL?

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PARALLEL CORDS CUSHIONED IN RUBBER

as in U. S. Royal Cord Air Hose?

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Atomic Energy Commission report holds both bad and good news for construction:

- **World-wide drop in fossil-fuel prices makes competition rougher for nuclear power, although . . .**
- **AEC Chairman John McCone *(right)* says some types of nuclear plants can compete now in some areas.**

Stretch-Out Ahead for A-Power Building

The Atomic Energy Commission reported to Congress last week a 10-year program for development of "competitive" nuclear power. The program is heavy on research and development, uncertain over construction of large power plants.

Testimony at hearings held by the Joint Congressional Committee on Atomic Energy indicated that pressure for immediate commercial applications of nuclear reactors had been eased by lack of competition from the Soviet Union. Both the report and the hearings also disclosed that falling prices of coal and oil tend to delay the time when nuclear energy will be competitive with them.

Nevertheless, AEC Chairman John McCone told the committee, it is now possible to build pressurized water reactors that would be competitive with fossil-fuel plants in high-fuel-cost areas. The AEC estimates conventional power costs in these areas to be about 7 mills per kwh for a 300-emw (300,000 electrical megawatts) single-unit, fossil-fuel station. The fuel is assumed to cost 35 cents per million Btu and the plants to have 80% capacity factor and 14% fixed charges.

The itemized construction budget for fiscal year 1961 that the AEC sent to Capitol Hill didn't include a single new civilian power reactor.

The AEC 10-year program aims at development of different reactor concepts in three phases. In the first phase, reactor experiments will be carried out or experimental reactors built. If these are successful, prototypes will be constructed in the second phase, preferably by utilities. And in the third phase, plants of commercial proportions will be constructed, by private industry.

The AEC plans a continuing evaluation and reappraisal of this program, which aims at reducing cost of nuclear power to levels competitive with power from fossil fuels in high-cost-energy areas of the U. S. by 1968. Longer-range objectives include further cost reduction and development of breeder-type reactors to make full use of the nuclear energy latent in uranium and thorium. U-235 alone may not be sufficiently plentiful to meet our long-range needs.

Expenditures on its program will average about $230 million per year from 1960 to 1970, AEC estimates. Of this amount, about $108 million will go for research and development and $122 million for construction.

Authorization requests in the 1961 AEC bill add up to $171 million. But only $24 million is asked for a new reactor, an advanced test reactor not designed to produce power. A test installation for Project Rover, for development of a nuclear-powered rocket at Los Alamos, N. M., is assigned $20 million. Alterations to the Shippingport reactor are assigned $9 million to permit operations at 150 emw; it was designed originally for 60 emw.

A request for $15 million is made for unsolicited proposals, which would support bids from the utility industry to construct either full-scale or prototype plants. And if utilities do not choose to construct the organic-moderated prototype for which they were invited to submit proposals last December, $25 million has been asked for the AEC to build it. The money may be used for other type reactors if a utility were to construct the organic reactor.

Capital Costs in Mills/Kwh of Nuclear Power Plants
(Sept., 1959)

Type of Reactor	Size in EMW Generated 100	200	300
Pressurized water	7.7	5.6	4.8
Boiling water	8.6	6.4	5.5
Organic cooled	6.3	4.8	4.5
Sodium-graphite	10.4	7.5	6.0
Fast Breeder	8.2	5.9	5.0
Heavy water	11.0	8.5	7.2
Gas cooled	12.2	9.2	7.6

At present, nine power-producing reactors have been completed in the U. S. They have a combined capacity of 258 emw. Thermal capacity is from four to 15 times greater; some of the power reactors are used also for producing steam for space heating.

By the end of next year, the U. S. may have five more nuclear plants on the line. They will add 148 emw to existing capacity. By the end of 1961, if other plants now under construction are completed, the U. S. will have another 133 emw.

Another eight reactors, with a total capacity of about 250 emw, are in a stage called "preconstruction development." Plans have been announced for at least another eight with a combined capacity of 800 emw.

There are three U. S.-sponsored nuclear plants under construction abroad and one more is under contract. Two of these are for Italy, one for Germany and one for Belgium.

The AEC report also disclosed that it has had to extend its timetable for achieving competitive nuclear-power costs abroad. The original hope was that competitive levels could be reached in Western Europe in about five years. In the last two years, however, increased availability of fossil fuels and a drop in their shipping costs have postponed attainment of this objective to about

the same time that it will be reached in the U. S.

When the U. S.-Euratom program was started two years ago, the plan was for the U. S. to help the six-nation nuclear-energy pool construct half a dozen power plants with a total capacity of 1,000 emw by 1965. But AEC Commissioner John F. Floberg, testifying before the Joint Congressional Committee last week, conceded that no new reactor project had been proposed under the joint program.

In the U. S., dropping fossil-fuel prices appear to be only one factor in the extension of the timetable for development of competitive nuclear power. **AEC Chairman McCone said during the "state-of-the-atom" hearings last week that Soviet Premier Nikita Khrushchev had told President Eisenhower that high costs had soured Russia on nuclear power.** Consequently, the Soviet Union is expanding its coal, oil and hydroelectric sources of energy, rather than investing in nuclear power.

Rep. Chet Holifield (D., Calif.) said that Mr. McCone had indicated our national objective had changed from a brisk industrial program to one now where we can slow up considerably since the Russians aren't doing too much. Rep. Holifield said it had always been his impression that the reason we needed an accelerated program was that we didn't want to fall behind Russia.

Mr. McCone denied that this was so: "Our program hasn't been influenced by the Soviet one; but theirs has been influenced greatly by ours. We should go ahead with the developmental program as fast as we can in line with current technological progress."

The AEC report on its 10-year program outlined its plans for different reactor concepts and its present evaluation of their potentials (see p. 34).

• **Light water-cooled reactors**—There is a relatively high probability that this type can achieve competitive power in the reasonably near future in the high-cost-fuel areas of the U. S. where large single units are practical. In addition, water reactors also offer a longer-range potential for being competitive in many other areas of the U. S. Included are pressurized and boiling-water reactors and variations of them.

Over the next four or five years, AEC-supported research and development work on water reactors will be aimed primarily at solutions of the problems of nuclear superheat, increased fuel life, decreased fuel costs, simplified fabrication techniques, fuel management, simplified and less costly containment methods and cheaper materials and construction methods. A major effort will be made to develop techniques for economically utilizing plutonium as a fuel.

• **Organic-cooled reactors** – Probability is relatively high that this type can achieve competitive power in high-fuel-cost areas of the U. S. by the middle 1960s and in the longer range over many other areas. It looks as if this concept can achieve its early potential with less research and construction of experimental units than required for other reactor concepts.

• **Sodium-cooled reactors** – These have a high potential for achieving competitive power in large areas of the U. S. in the late 1960s or early 1970s. There are problems with fuel elements and components that must be solved before the sodium-cooled type can reach its full potential.

• **Enriched gas-cooled reactors**—These offer the potential of producing superheated steam of the quality currently in use in large conventional central-station power plants, with resulting high efficiency. After operating experience is gained from programmed reactors, sufficient information may be available by the early 1970s to permit utilities to decide, on economic grounds, to construct in high-fuel-cost areas a 300 to 500 emw gas-cooled reactor.

• **Heavy water reactors**—An evaluation of this concept may be possible by 1966 or 1967, when operating and cost data are available from U. S. and Canadian heavy water reactors.

• **Aqueous homogeneous reactors**—It is still too early to determine whether the simplicity of the fuel cycle and potential breeding will be more than offset by technical complexities and temperature limitations. Research and development will be carried out on a long-range basis.

New concepts—Early construction of inexpensive reactor experiments may be justified to help determine the technical feasibility of advanced designs that look promising.

Road Probers Hear Cost of Clearances

Applying the new 16-ft minimum vertical clearance requirement to future overhead structures on Interstate highways will add about $195 million to the construction cost. This estimate, given last week to the House special subcommittee investigating the federal-aid highway program, firmed up past guesses that the cost would approximate $200 million (ENR Feb. 11, p. 21).

Eric L. Erickson, chief of the Bureau of Public Roads bridge division, supplied cost estimates both for 16 ft, the new standard adopted Jan. 27, and for 17 ft, the clearance requested by the Defense Department Oct. 1.

To raise existing overhead structures as well as future bridges to 16 ft, he told the committee, would cost a total of about $925 million. This figure included $250 million for structures built since the Interstate program got under way in 1956 and $480 million for others, constructed prior to that time, on highways incorporated into the system.

For 17-ft overhead clearance, Mr. Erickson furnished BPR estimates totaling more than $1.1 billion: $313 million for future structures, $330 million for those built since 1956, and $480 million for other existing spans constructed earlier. The estimate for the last category is the same for either 16 ft or 17 ft, he explained, because the cost of rebuilding all the older bridges would be unaffected by a 1-ft difference in clearance.

Indecision and uncertainty over the clearance standard last fall delayed Interstate progress in at least 21 states, the subcommittee brought out. It submitted in evidence a summary of a Jan. 1 questionnaire survey that the American Association of State Highway Officials had conducted at the request of the committee staff.

Answers from the states made it clear that a period of confusion and conflicting instructions had followed AASHO approval of the 17-ft standard at its annual meeting Oct. 11. State and BPR officials went home from that meeting with full expectation that the Commerce Department would promptly adopt the new clearance requirement, last week's testimony showed.

Some states held up all work on future overhead structures, others proceeded on instructions to revise all affected spans to 17 ft, and still others went ahead using the old standard.

The committee finished up its hearing on bridge clearances on Interstate highways Friday with testimony from Federal Highway Administrator Bertram Tallamy, Deputy Administrator Frank Turner, Assistant Secretary of Defense Perkins McGuire and Lt. Gen. Bernard A. Schriever, Air Force missiles chief.

In general, their testimony supported that of earlier witnesses: That for several months last fall BPR, the Pentagon and the various states were confused as to the status of the proposed revision of minimum clearances.

General Schriever revealed that the previous minimum of 14 ft would be all right for missiles, but that missile supporting equipment and other military items were the basis for the new decision on bridge heights.

Last Bomarc Bases Up for Bid

The Army Corps of Engineers will ask for bids in April on construction of Bomarc missile bases at Minot AFB, N. D.; Glasgow AFB, Mont.; and Malmstrom AFB, Mont.

Construction costs for each of the bases is estimated at $3 million. Each installation will house 28 launchers for the Air Force's Bomarc B, the nuclear-tipped, antiaircraft missile with a range of some 400 miles. It is launched by a solid-propellant rocket that is jettisoned after firing and then powered to target by a ramjet engine.

The Bomarc bases will tie into the Air Force's network of SAGE air defense installations now under construction. The SAGE electronic control centers will track enemy planes, compute their flight path, then automatically launch and guide Bomarc missiles from sites several hundred miles away.

As plans shape up now, deadline for bids on the three new Bomarc base construction projects will be in May. Contracts will probably be awarded in June. Construction will be scheduled for completion within the next 18 months.

These will be the last Bomarc bases to be built, as the Pentagon budget now stands. Thirteen other Bomarc sites have already been built or are still under construction.

The Minot, Glasgow, and Malmstrom bases will be built with funds appropriated for fiscal 1959. No funds were appropriated this year for Bomarc construction, nor were funds requested in the Defense Department's 1961 budget.

But a Pentagon construction official says a sixteenth Bomarc site is still planned for Charleston, S. C., and may be included in the fiscal 1962 budget. This project was apparently knocked out of the Air Force's original construction budget proposed for next year. It's questionable, however, whether funds will ever be earmarked for this base since it could not be operational for another three years or so.

The current 15-base Bomarc program is a far cry from the Air Force's original plans, drafted in 1956, for 40 installations.

The Bomarc missile has been the center of a long-simmering policy squabble over air defense construction. One facet of the dispute has been Bomarc's rivalry with the Army's Nike-Hercules antiaircraft missile. Another has been Washington's increasingly lukewarm view of antiaircraft defenses at a time when Russia has trimmed its long-range bomber production and stressed output of intercontinental ballistic missiles. There is no known defense against the ICBM.

In the wake of this controversy, construction plans both for the Bomarc and Nike-Hercules missiles were substantially slashed last year.

Construction of the Nike-Hercules bases is virtually completed, except for modifications to existing sites.

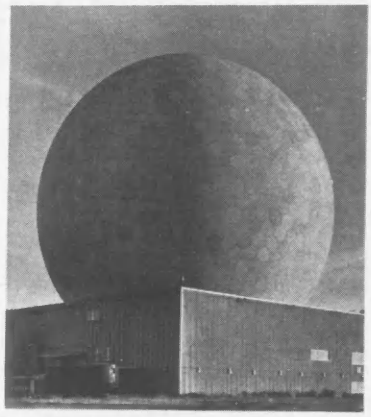
In addition to the new Bomarc sites at Minot, Glasgow, and Malmstrom—and possibly at Charleston, S. C.—the Air Force also plans to enlarge four existing installations at McGuire AFB, N. J.; Otis AFB, Mass.; Dow AFB, Me.; and Suffolk County AFB, N. Y. A base at Langley AFB, Va. is expected to be completed this summer.

These bases are armed with the shorter-range (200 miles) Bomarc A missile. This version of the missile is launched by a liquid-propellant rocket.

Other Bomarc bases are now under construction at Niagara Falls, Municipal Airport, N. Y.; Kinross AFB, Mich.; Duluth Municipal Airport, Minn.; Paine AFB, Wash.; Camp Adair, Ore.; Vandenberg AFB, Calif., and Travis AFB, Calif.

These seven bases, all designed to handle the Bomarc B solid-fueled version, will be completed later this year.

In last year's Pentagon reappraisal of air defense bases, plans for construction of Bomarc sites at Ethan Allen AFB, Vt. and Truax AFB, Wis. were canceled. The cancellations were made after selection of architect-engineering contractors and invitations to bid.



An 84-ft tracking radar will go inside a 140-ft dome.

BMEWS for England Is Different

Announcement that the third of the three Ballistic Missile Early Warning System (BMEWS) stations will be located at Fylingsdale Moor, Yorkshire, in northeast England, also revealed that it will be different from those being built at Thule, Greenland, and Clear, Alaska (ENR Dec. 24, 1959, p. 26).

Instead of the fixed, rectangular reflector antennas, 400 ft long and 165 ft high, of the surveillance radar setup at Thule and Clear, the Yorkshire installation will use a tracking radar with an 84-ft-dia rotating reflector placed inside a 140-ft-dia dome.

Although provisions have also been made to use tracking radar at Thule and Clear no equipment installation is planned for the present.

The pictures above show the radar destined for Yorkshire erected for testing at the Moorestown, N. J., plant of Radio Corporation of America, prime contractor to the U.S. Air Force for BMEWS.

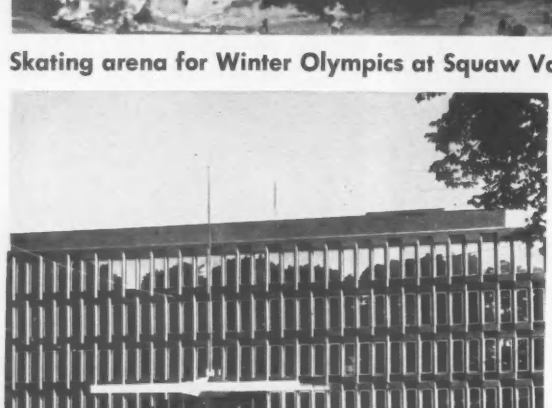
In operation, the radar will first detect a missile by scanning the sky, then "lock" its beam onto the missile to furnish information on the trajectory to electronic computers at the station. There the information will be automatically interpreted and sent instantaneously to the North American Air Defense Command Headquarters at Colorado Springs.

The tracker antenna and its pedestal weigh about 200 tons. The rotating section accounts for more than half of this weight. The antenna revolves on ball bearings of 3½ in. The 140-ft-dia dome enclosure is non-metallic to permit unobstructed passage of the radar beam and its reflected signals. It is made of paper pressed into a honeycomb design and faced with plastic impregnated fiberglass.

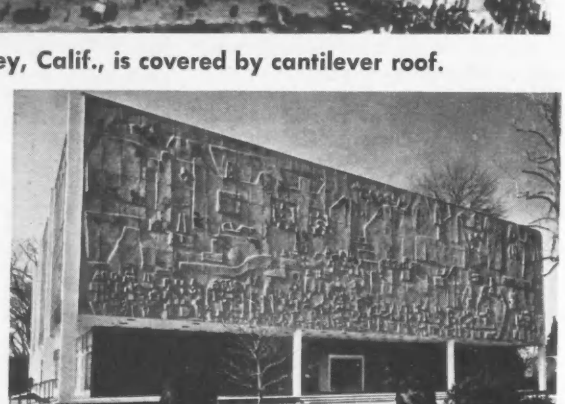
Major subcontractors to RCA on the BMEWS project are General Electric Co., Sylvania Electronic Products Co., and Goodyear Aircraft Corp.

AIA to Honor Five Structures

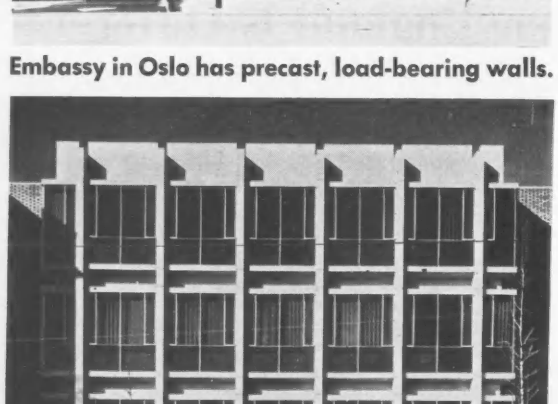
Skating arena for Winter Olympics at Squaw Valley, Calif., is covered by cantilever roof.



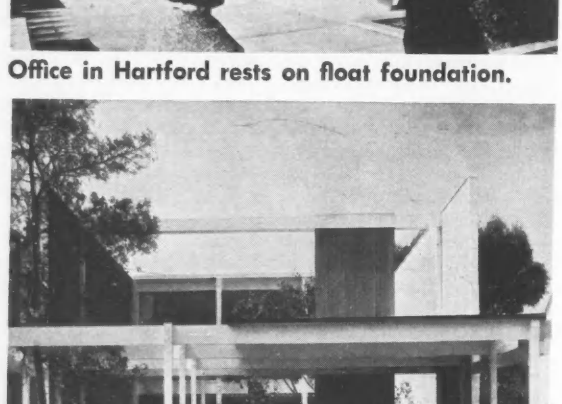
Embassy in Oslo has precast, load-bearing walls.



Office in Hartford rests on float foundation.



School in Philadelphia accents its frame.



Home in California offers space on small plot.

in April

The American Institute of Architects will present five First Honor Awards for building design when it meets for its annual convention at San Francisco in April. The structures—ranging from an embassy building in Oslo to a home in California—will be cited by AIA for "true leadership in architectural design." They are:

• Blyth Olympic Ice Arena, Squaw Valley, Calif. (ENR July 30, 1959, p. 30). Corlett & Spaceman and Kitchen & Hunt, San Francisco, designed a double structure—reinforced concrete grandstand and double cantilevered roof—to seat 8,000 for the VIII Olympic Winter Games under way at Squaw Valley this week. Structural engineers for the arena were the firms of H. J. Brunnier and John M. Sardis.

• U. S. Embassy Office Building, Oslo, Norway. Eero Saarinen & Associates produced the four-story, wall-bearing structure that depends on staggered, precast concrete window frames extending from floor to floor to carry loads down through the structure.

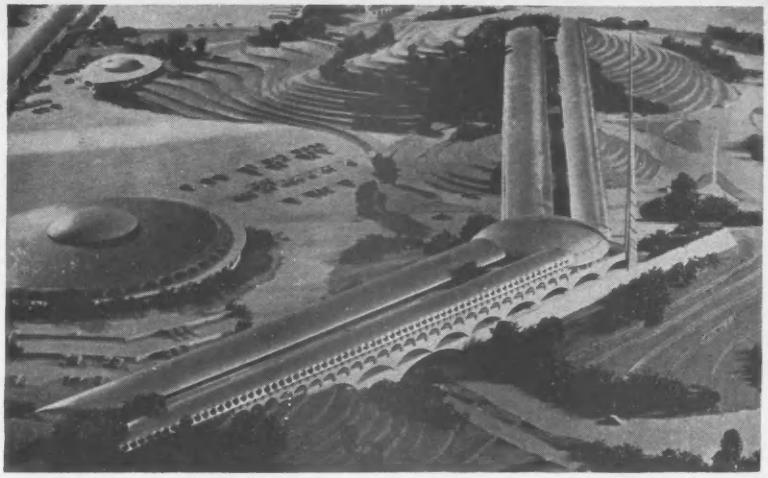
• Mutual Insurance Company of Hartford, Conn. Paneled with an impressive bas-relief wall, this executive headquarters building by Sherwood, Mills and Smith, Stamford, Conn., architects, posed an impressive foundation problem for Werner-Jensen and Korst, structural engineers.

Because of soil conditions at the site, they determined the allowable height of the building by its bouyancy under load. Below grade, the structure floats on a reinforced concrete structure. Above grade, it's steel-framed. Terraces on all sides of the building are actually structural slabs hinged at the building line to act as outriggers, stabilizing the building.

• Moore School of Electrical Engineering, University of Pennsylvania, at Philadelphia. Robert L. Geddes, Melvin Brecker and Warren W. Cunningham collaborated on the design of this reinforced concrete building. Dorfman and Bloom was the structural engineer. All are of Philadelphia.

• Residence for Richard Opdahl, Long Beach, Calif., designed by Killingworth, Brady & Smith, Long Beach, Calif., architects.

The AIA jury will make its awards from a total of 289 projects submitted for consideration. In addition, there will be 11 Awards of Merit covering a variety of projects. Among them are a chemical research center, two religious buildings, a shopping center, two residences, two housing projects, an atomic reactor laboratory, an aircraft hangar and an apartment building development.



Work Starts on Wright's Center

One of the last major works designed by Frank Lloyd Wright, the Marin County, Calif., Civic Center, entered first stages of construction last week.

The County Board of Supervisors commissioned Mr. Wright in July, 1957, to design a combined government and cultural center plus a permanent fairgrounds site.

The work started last week is the first of three construction stages. It will cover the first wing of a main administration building containing meeting rooms, offices and a data processing center, plus a county library housed within a large dome structure.

Second-stage construction will include the second wing of the administration building. The last stage calls for a domed civic auditorium, a health and welfare building and a three-acre fair pavilion with a 3,000-seat auditorium.

The 540-ft-long administration building now started will be precast, prestressed concrete with arched, concrete-covered steel walls hung as sunshades at the cantilevered edges of the floors. A double-arched roof and the library dome will be thin-shell concrete cast over precast arch frames.

First-stage builder is Rothschild, Raffin and Weirick, of San Francisco. Cost of the first portion of the center should be about $3.5 million.

Groups Differ on Soviet Power

Russian power development either is or is not a threat to the U. S., depending on your stand in the perennial public-vs-private power debate in the U. S.

That is at least a possible inference to be drawn from two recent reports issued by U. S. groups who have toured Soviet power projects.

The U. S. is far ahead of the Soviet Union in power output now and is increasing its lead, according to private electric industry representatives who toured Russia in 1958 and 1959.

The U. S. S. R. is catching up with U. S. power production and will take the lead in 15 years unless we speed up or they slow down, according to a U. S. Senate group who inspected Soviet power installations last summer.

The private-power view was aired in public statements and a 96-page report issued last week by the Edison Electric Institute, an association of private electric utilities. The Senate group, a subcommittee of the Committees on Interior and Insular Affairs and Public Works, had issued its report in January.

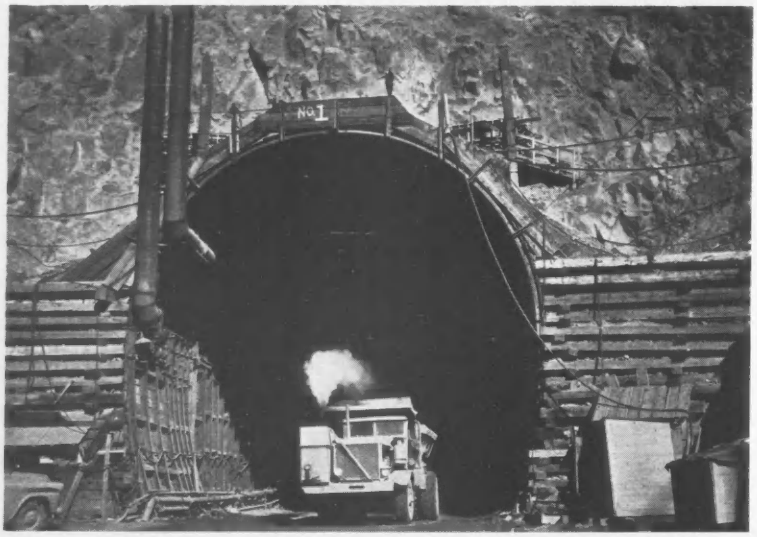
The Senate group reported that the Soviets build big hydro dams much faster than we do. The group attributed the speed to authoritarian financing and administration and extensive use of time-saving construction techniques.

The Senate report deplored U. S. lag on construction of hydro plants and lack of planned and existing transcontinental inter-ties among systems.

In what might be construed as the private-power reply, Donald S. Kennedy, board chairman and president of Oklahoma Gas & Electric Co., declared: "Building power capacity in excess of actual needs will not of itself increase the total production of an economic system." Walker J. Cisler, president of Detroit Edison Co., said that Mr. Khrushchev has de-emphasized hydro construction in favor of thermal power for the current Seven-Year Plan, both to cut the capital investment and construction time and to avoid necessity for long transmission lines from hydro plants to population centers.

Oxbow Pushed for 1961 Power

SNAKE RIVER BEND along Oregon-Idaho border is the site for Oxbow hydro project. Twin power tunnels run through hogback to reach site of 200,000-kw powerhouse.



POWER TUNNEL muck was hauled out by end-dump trucks. Muck inside the 42-ft bores was handled by an electric power shovel and a loader.

Morrison-Knudsen is making steady progress toward getting Idaho Power Co.'s Oxbow Dam hydro project on the line sometime next year.

Construction crews on the Snake River job are now concreting the twin power tunnels and surge tanks and adding the final 50 ft of height to the 205-ft-high rockfill dam.

They have completed the apron, abutment and piers for the spillway section on the Oregon side of the river and are excavating for the spillway section on the Idaho side. They have virtually finished the powerhouse excavation, fabricated most of the penstock sections and driven tunnels for the penstocks.

Oxbow Dam is the second of Idaho Power Co.'s three planned dams for the Hells Canyon reach of the Snake. Brownlee Dam, first of the three, produced first power in 1958 (ENR Aug. 28, 1958, p. 17). Hells Canyon Dam, third of the group, is scheduled for a construction start sometime next year.

Driving the power tunnels was a major construction phase at Oxbow last year. Cutting through the narrow rock promontory that divides the two legs of the river's oxbow bend, the tunnels are about 1,000 ft long and 42 ft in diameter. The final 170-ft run to the powerhouse will be through four 27-ft-dia penstocks.

A self-propelled, four-deck jumbo was specially built for about $250,000 for the tunnel driving. Rail-mounted, 40 ft wide and 40 ft long, it carries 20 drills.

A power shovel, mucking machine and end-dump trucks were used for mucking. To cut down fumes, the shovel was converted from diesel to electric power, and the trucks were equipped with exhaust "scrubbers."

The tunnels were shored with steel ribs spaced from 18 in. to 7 ft apart. The portals are timbered and collared. Telescopic, rail-mounted forms are used in applying the concrete lining.

Oxbow construction is now on a five-day, two-shift basis.

Fish-conservation facilities at Oxbow are part of a Hells Canyon system that will eventually cost Idaho Power Co. $11 million. Fish migrating upstream are trapped below Oxbow Dam, hauled upstream in special tank trucks and released above Brownlee Dam, which is 12 miles upstream from Oxbow. The system is reversed for fingerlings bound downstream. They are trapped above Brownlee and released below Oxbow (ENR Aug. 14, 1958, p. 46).

International Engineering Co., of San Francisco, designed the Oxbow Dam Project.

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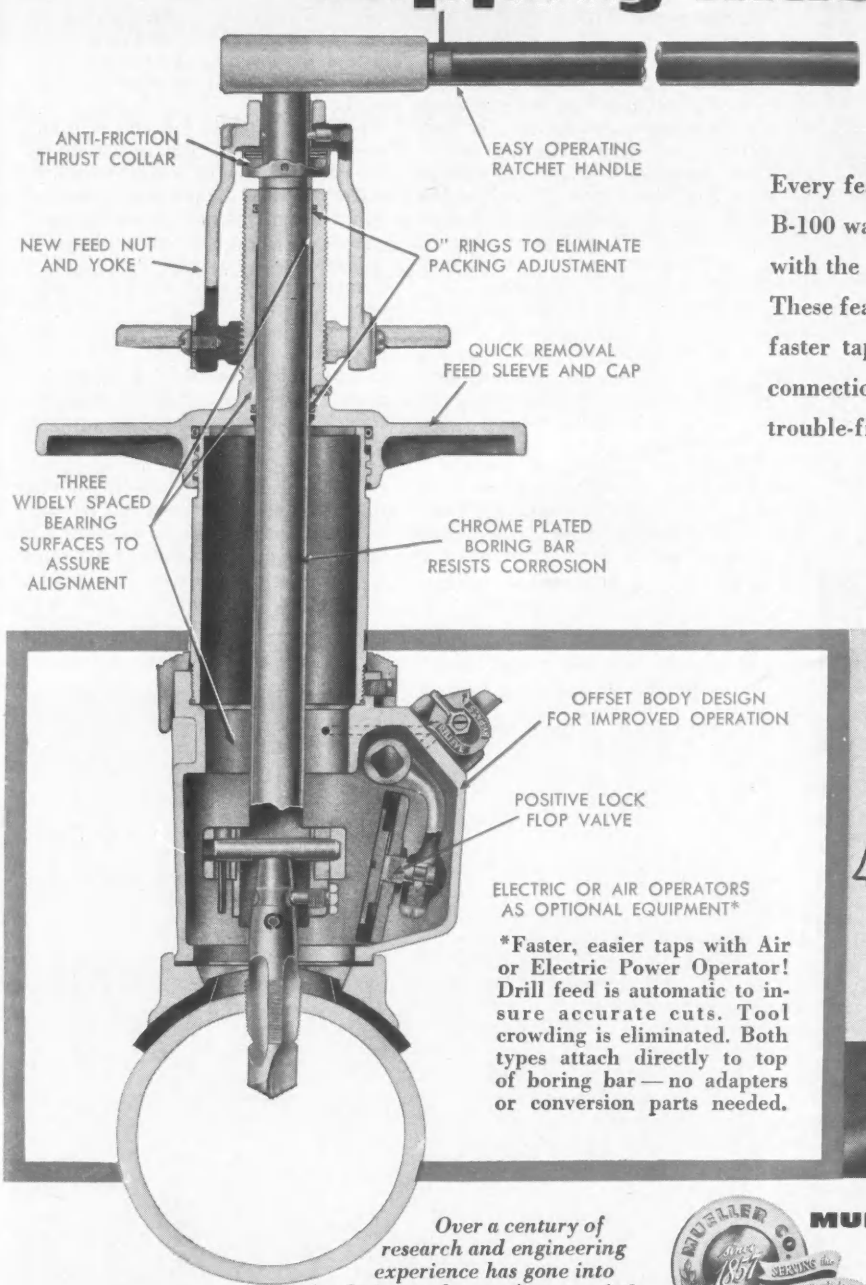
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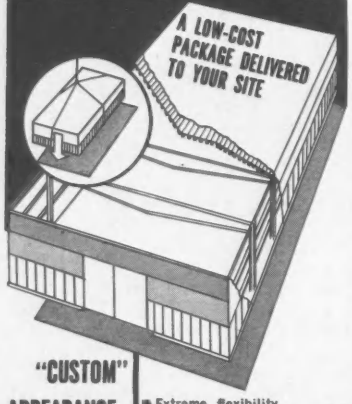

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Equipment Has More Automation

Producers of sand, gravel and ready-mixed concrete who have been looking for equipment that offers increased automation, higher production rates, ruggedness and versatility found it on display in Chicago last week at the combined convention of the National Sand and Gravel Association and the National Ready Mixed Concrete Association.

Manufacturers are giving concrete producers push-button and punch-card control panels that take the guesswork out of making quality concrete in both portable and central mixing plants. Their operation is simple and easy to learn, and their accuracy is well within tolerance limits of even the most rigid specifications. Control panels provide for batching as many as 10 separate ingredients in any combination.

In transit-mix trucks the trend continues toward bigger payloads without exceeding permissible axle loadings. Aluminum is replacing structural steel in some models. Manufacturers are talking of tougher, lightweight alloys that are stronger and more resistant to abrasion.

One new model transit-mix truck soon to be in production on the West Coast features front-end, over-the-cab charging and discharging instead of at the rear.

Jumbo-size tires up to 46 in. wide provide optimum flotation for off-highway carriers of transit mixers operating in sand, mud or swampland. Flywheel take-off drives for operating mixer drums, now available on complete package carriers, mean fewer parts, less maintenance and more efficient operation.

In portable screening and washing plants more positive separation, lower maintenance and increased production are possible through a combination of compressed air and rubber mountings instead of conventional metal leafs and coil springs as well as other improvements.

Improved crushers can now turn out more tonnage per hour by mounting two moving jaws in a single crusher.

Ready-mixed concrete producers want to make closer checks on their end products to insure meeting construction specifications. To help them, testing equipment has been developed to determine quickly the moisture content of sand, and the amount of entrained air in concrete.

A portable two-man compression machine can develop 250,000 lb pressure, enough to crush a standard 6-in.-dia cylinder made of 8,000 psi concrete.

Two-way radio communication between concrete plant and transit-mix trucks provides better service through the use of transistorized sets. They are becoming more dependable and require less maintenance. In some cases ready-mixed concrete producers and contractors can rent the entire communication system with an option to buy.

Around the Country . . .

• **Concrete progress**—First concrete will be placed at Glen Canyon Dam by early July, according to Merritt-Chapman & Scott. Halted by a six-month strike last year, the $325-million job was resumed in January (ENR Jan. 7, p. 19). A 750-ton-per-hour aggregate plant and conveyors will feed mixers that will consume 3 million bbl of cement to form Glen Canyon's 700-ft concrete arch.

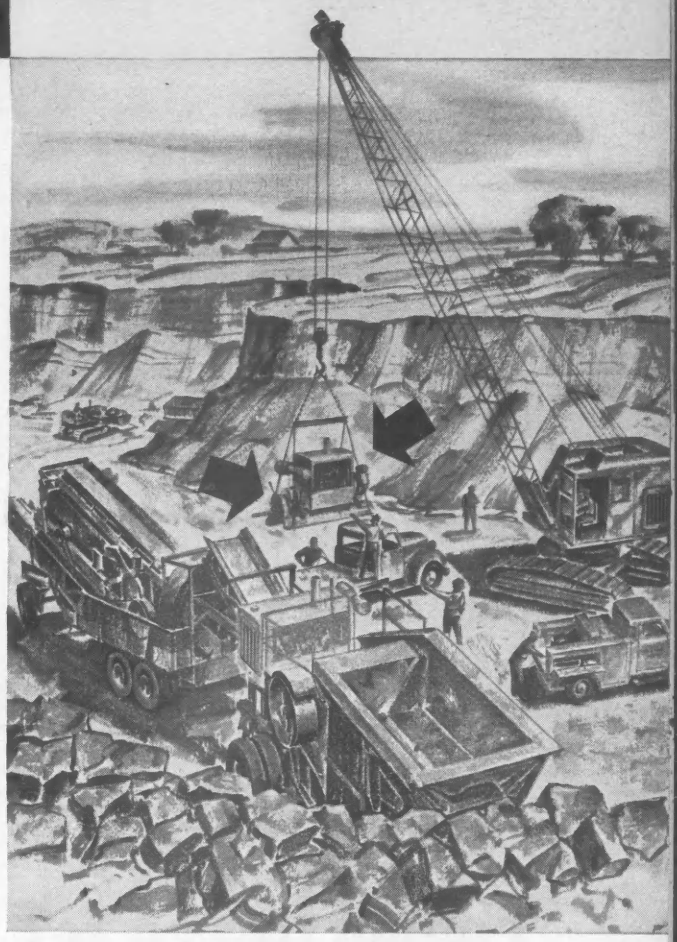
• **Seagoing polluters**—Even deep-draft ship masters soon will be forced to consider water pollution while studying their navigation charts on the St. Lawrence Seaway and the Great Lakes. Effective this spring, shipping plying these waters will be required to avoid specifically delimited areas where dumping of untreated waste might contaminate the water supply of port communities. An 80% increase in shipping during the Seaway's first season of operation makes the ruling necessary, according to a report from the U. S. Public Health Service.

• **Boston auditorium**—The Boston Auditorium Commission is now taking bids on $12-million replacement for old Mechanics Hall, razed to make way for Prudential Center construction. The new 6,000 seat auditorium and show building though located in the Center, will be city-owned.

• **Bluegrass-Hoosier Bridge**—R. C. Mahon, Detroit, will erect the superstructure of the New Albany-Louisville Bridge over the Ohio River under a $5.4-million contract. The 1,600-ft-long steel structure has a unique tandem tied-arch, double-deck design (ENR Jan. 8, 1959, p. 24). Roy Ryan & Sons, Evansville, Ind. has begun construction of the $1.5-million substructure.

engine power
BY CATERPILLAR

REPOWER WITH BOTH ENDS



When you repower crusher operations with Cat "Two-Handed" Engines, you can often get higher production with better efficiency. Caterpillar offers nine engines with transmission at one end and generator at the other, can give you full mechanical *and* full electrical power from a single power source. There are Cat "Two-Handed" Engines from 75 HP to 650 HP.

The transmission end drives the jaw and drum crusher through simple direct connections. The generator, which is matched to the engine, powers screens and conveyor belts. You get better push-button control and excellent material flow. The electrical "hand" also gives power for area night lighting and for electrical tools.

Cat "Two-Handed" Engines for the most part offer Turbocharging—Caterpillar's own design—as standard equipment, for more power per unit of weight. And compact engines mean more portability. Truck-mounting is simple. Engines are 4-cycle design with single orifice injection-precombustion chamber fuel system. Both generator and transmission may be serviced separately, affording easy maintenance.

Before you repower or order new equipment, have your Caterpillar Dealer help you analyze your electrical or mechanical power requirements. He has a lot of good information for you. If you decide on Caterpillar "Two-Handed" Engines, he will see that you get the right installation. He'll be right there with genuine Cat parts and the best of service wherever your equipment works.

Write today for the valuable "Repowering Handbook Packet." It's FREE. It can show you how to make more profit from your power.

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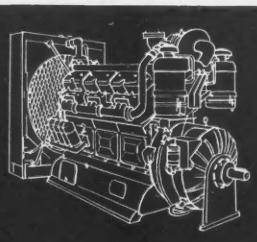
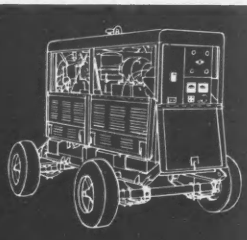
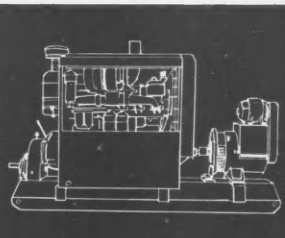


Your electrical power requirements vary widely. Caterpillar offers portable or stationary Diesel Electric Sets from 30 to 350 KW.



"Two-Handed" configurations increase engine's versatility with electric generator at one end and a mechanical drive at the opposite end.



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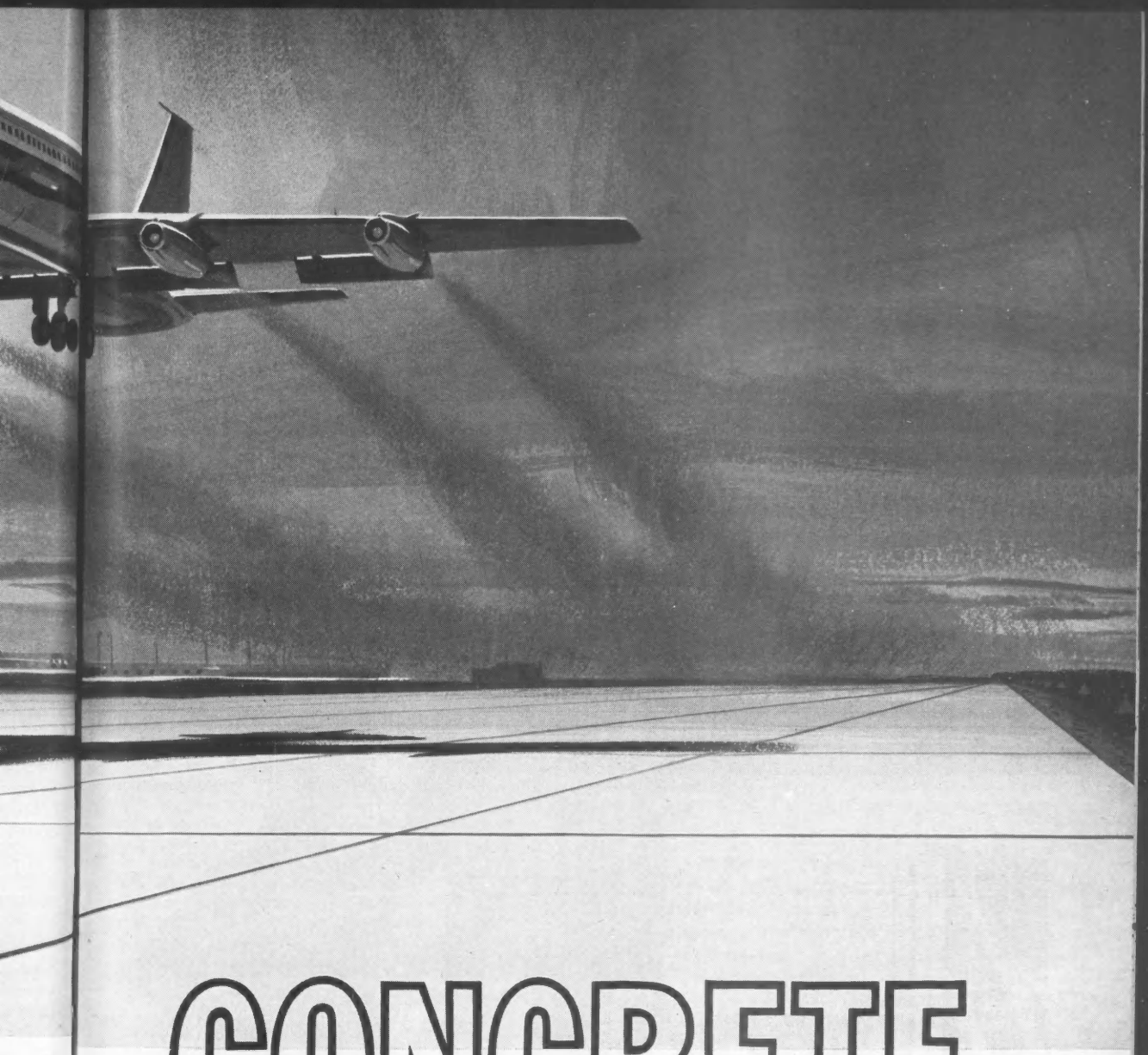
Concrete

Runways at Chicago's O'Hare Field now converted to jet use by an overlay

With concrete, the strength is in the concrete itself. It is not just a smoothing overlay. Loads can be computed *mathematically*. With the bearing values of the soil plus the old pavement at O'Hare, 11 inches of concrete did the job—a big savings. Because the flexible pavement had become channelized and rutted, a 3-inch granular leveling course was used to insure uniform concrete thickness.



lay of CONCRETE

Resurfacing with concrete turns old runways into new . . . brings them up to jet-age needs

At Chicago-O'Hare International Airport, they simply covered the flexible pavement with modern concrete. With the old pavement serving as a subbase, 11 inches of concrete gives the necessary strength to handle the heaviest jet wheel loads expected.

The *beam* strength of concrete makes such overlays possible. Concrete is the only paving material that can be precisely designed to match *future* loads. That's why concrete runways can be expected to last 50 years and longer. There won't be any waviness or channelization, even under 150-ton jet airliner weights. And concrete withstands the heat of jet blasts, and the action of spilled fuel, as no other pavement can.

Concrete is the high-safety pavement—pilots themselves will tell you this. It is light-colored for maximum visibility. Its grainy surface means dependable skid resistance and better braking. Concrete creates no dragging action on take-offs.

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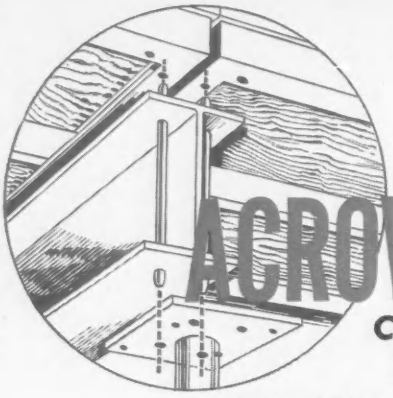

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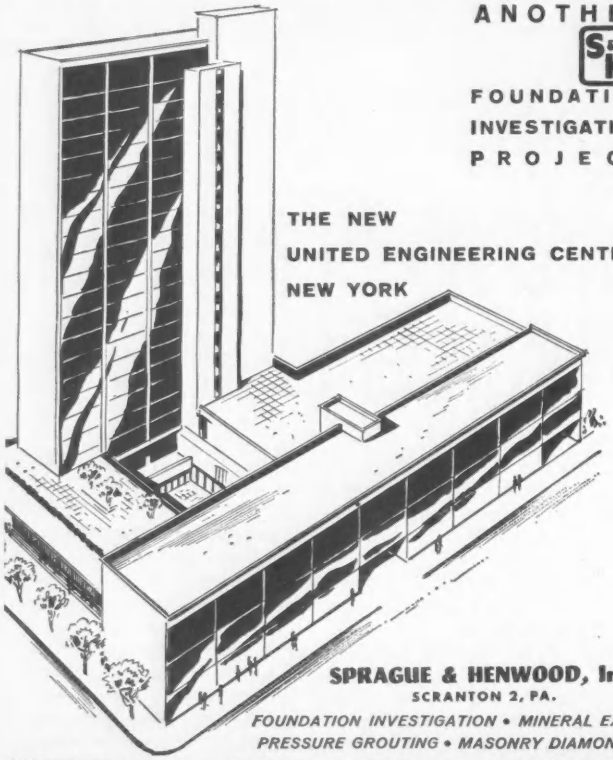

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Boom Beats Bridge to Draw; Bridge Beats Boom to Pulp

A floating crane has come out second best in a tussle with the recently completed Staten Island Rapid Transit Railroad Bridge across the Arthur Kill between Elizabeth, N. J. and Staten Island, N. Y. The 458-ft vertical lift span—longest in the world—was not damaged, but rail traffic over it was tied up for about 15 hours.

Ralph Smillie Dies, Designed Major Tunnels

Ralph Smillie, 72, consulting engineer and leading tunnel designer, died in Montclair, N. J. A partner in the firm of Smillie and Griffin, New York City, Mr. Smillie played a primary role in the design of the Lincoln and Holland tunnels and the construction of the Brooklyn-Battery Tunnel in the New York metropolitan area. He served as designer and consultant on a large number of other tunnels in this country and Canada.

Mr. Smillie received a bachelor of arts degree from Yale in 1909, a civil engineering degree from Columbia in 1912, and a master of arts from Yale in 1915.

After early experience in steel plant and subway construction, he worked for the U. S. Navy during World War I. From 1919 to 1929, Mr. Smillie was assistant engineer of design and later engineer of design on the Holland Tunnel for the Port of New York Authority. In 1929, he became transit engineer of Newark, N. J.

From 1933 to 1945, Mr. Smillie served as engineer of design and engineer in charge of design for the Port of New York Authority.

In 1945, Mr. Smillie joined the Triborough Bridge and Tunnel Authority. Projects under his supervision included the construction of the Brooklyn-Battery Tunnel. Since 1950, he devoted full time to consulting.

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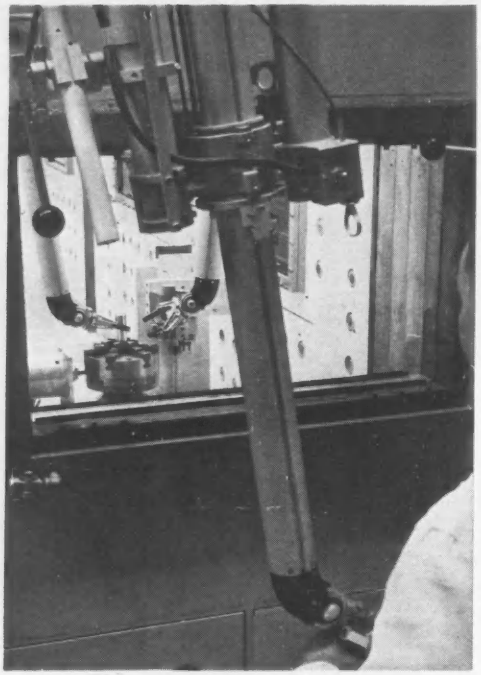
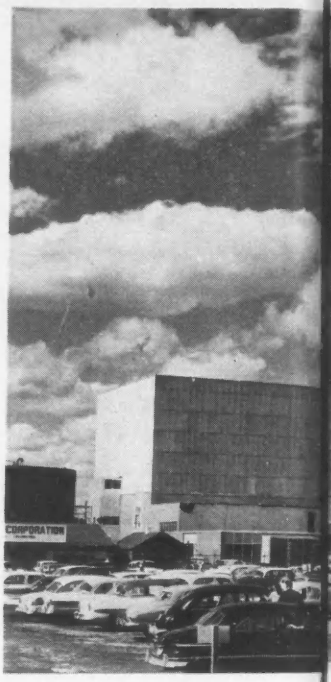




Researchers have tamed the atomic bomb. But that's not good enough. Power must be cheap.

New Reactor Designs Spur Search

By Frederick S. Merritt

New design concepts will be given a tryout in future U. S. nuclear reactor power plants. The Atomic Energy Commission's program (p. 21) seeks experience with their operation and ways to cut costs. The hope is that experience with these plants will indicate which types of reactors offer the best potential for producing low-cost power.

Basically, a nuclear power plant can be considered to consist of two major elements—a heat source fueled by nuclear energy and a conventional turbine-generator section. The first element is the part of the plant that differs from the usual power plant. It contains the nuclear reactor, heat exchangers and sometimes steam-producing units. That is the portion for which the development of new design concepts is being so eagerly sought.

The primary heat source in a nuclear reactor is fission of the nucleus of atoms. Research is also under way to develop heat, or electrical energy directly, from another process, called fusion. In this process nuclei are combined at temperatures measured in millions of degrees to release enormous amounts of energy (thermonuclear); but there has been no breakthrough to date.

For fuel, present nuclear reactors depend on an unstable, or radioactive element, principally an isotope of uranium. When such an element decays, it releases neutrons, heavy particles forming part of the core of an atom. If the neutrons strike other atomic nuclei with sufficient energy, they split them, releasing still more neutrons. With the right quantity of material in a reactor, it is possible to set up a chain reaction, so that fission and energy release are continuous.

A byproduct of fission is high-energy radiation, called gamma rays. This can be lethal, even for short-time exposure. So nuclear reactors must be enclosed in protective shields. Lead, water and concrete are materials commonly used for this purpose.

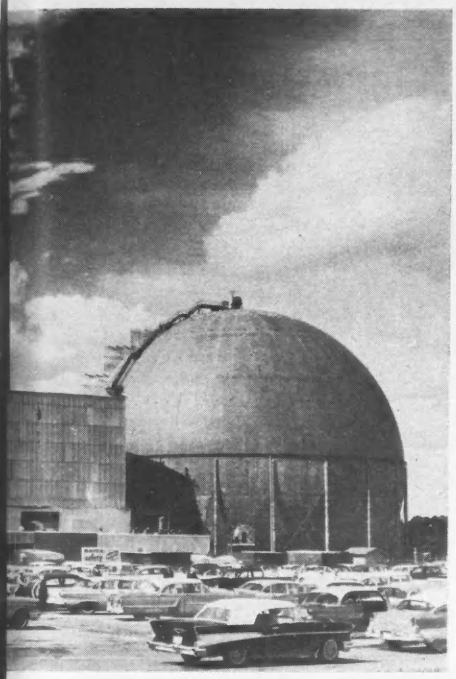
Because there is a possibility that the chain reaction may get out of hand and cause an explosion, power reactors also must be enclosed in a high-strength container, usually of steel plate. (Perhaps, after more experience with nuclear reactors, this enclosure may be eliminated.)

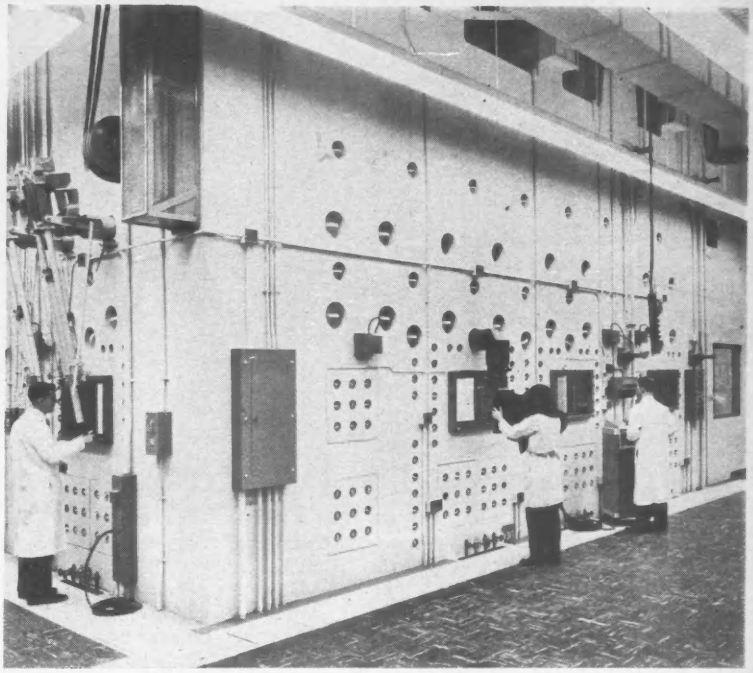
In most reactors, fuel is assembled in one region, called the core. The chain reaction that results is controlled by inserting into the core rods made of materials capable of absorbing neutrons. The farther the rods are pushed into the core, the fewer the neutrons available for fission and the less heat produced. As the rods are withdrawn, more neutrons become available for fission and more heat generated.

In certain types of reactors it is desirable to slow down the released neutrons. For when a nucleus splits, the neutrons are thrown out at high speed, and they are likely to escape without striking another nucleus. If they are slowed down, the chances of a hit are improved. So a material called a moderator is incorporated in the core to slow the neutrons. Water and graphite are commonly used.

If the heat produced in a reactor is to be put to work, some means must be found to extract it. Usually, the fuel elements are surrounded by a liquid or gas coolant, which is pumped to a heat exchanger or steam generator, where steam is produced to feed turbogenerators.

Senior Editor Fred Merritt *has followed the development of nuclear power for ENR from its postwar beginnings. In this article he provides a background of fundamental information upon which AEC's newly announced 10-year program can be judged.*





New nuclear power plants test different reactors in search of low-cost power.

for Inexpensive Nuclear Power

• **Pressurized water reactor**—In one type of reactor, water is used both as moderator and coolant. It is pumped to a heat exchanger under pressure so that it can be circulated at a high temperature without boiling. The core container, to be capable of withstanding the pressure, usually is made of thick structural steel plate or plate faced on the inside with stainless steel.

Because of its pressurized primary loop, this type of reactor is called a pressurized water reactor. Duquesne Light's 60 emw nuclear plant at Shippingport, Pa., employs this principle (ENR Sept 15, 1955, p. 23, and Feb. 14, 1957, p. 44).

• **Boiling-water reactor**—One way to cut capital costs of a nuclear plant is to eliminate the heat exchanger and reduce coolant pressure, permitting a thinner pressure vessel. This is one of the objectives of a boiling-water reactor.

Water is used both as moderator and coolant but is allowed to boil in the pressure vessel. The steam is fed directly to the turbines.

However, while small plants have been operated effectively on this principle, some authorities are uncertain that stability problems have been completely solved. They also fear that the coolant might contain radioactive substances and contaminate turbines and condensers.

Nevertheless, Commonwealth Edison Co. has enough confidence in this type to have constructed a 180 emw boiling-water plant at Dresden, Ill. The Rural Cooperative Power Association is building a smaller one at Elk River, Minn.

• **Organic reactor**—Liquids other than water can also be used as the coolant and moderator. One possibility that has been tried successfully on a small scale is a liquid organic chemical, which can be used in a pressurized system. Since an organic fluid contains a relatively large amount of hydrogen atoms, it possesses the qualities needed to slow neutrons as well as to remove heat from the fuel.

If an organic chemical with a high boiling point is chosen, the pressure vessel need not be as heavy as when water is used. Other advantages include low primary system pressure in the 600F to 800F range; compact core; no hazardous chemical reactions with other materials with which it comes in contact; negligible corrosion; standard construction materials and components can be used with it; and low induced radioactivity.

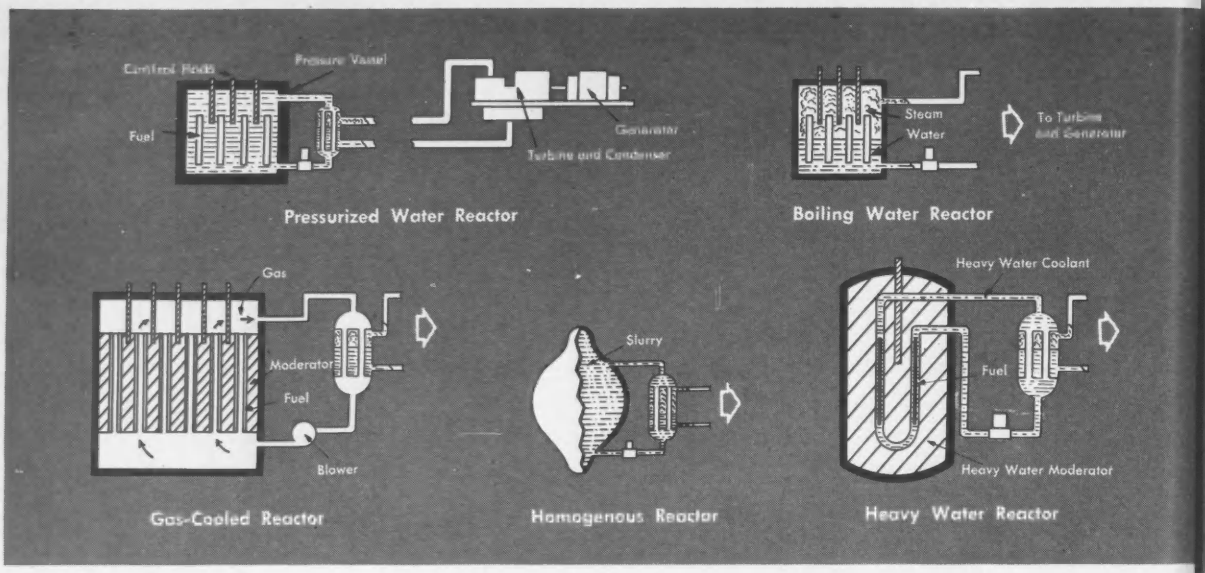
But there is a possibility that ionizing radiation may decompose the chemical, and heat-transfer surfaces may become fouled. However, research has revealed that the polyphenyl class of organics resists decomposition due to high temperatures and radiation. The city of Piqua, Ohio, has selected terphenyl as the organic moderator and coolant for the 11.4 emw plant it is building.

• **Sodium-graphite reactor**—Another possible substitute for water as a coolant is a liquid metal. Sodium is used because of its higher thermal capacity and because it permits cores to operate at very high power density.

But liquid sodium does not slow neutrons. So graphite, which does not react chemically with sodium, is incorporated in the core as a moderator. That's why this type of plant is called a sodium-graphite reactor.

These reactors permit fast neutrons to be used, because of the speed with which the liquid metal can remove heat. They also allow high-temperature steam to be generated without high-pressure piping or large pressure vessels.

Principal disadvantage of sodium is that it becomes highly radioactive. Hence, it must be isolated in a closed, shielded loop, and the heat it extracts



from the nuclear core must be transmitted to liquid metal for another loop in a shielded heat exchanger. The metal in the second loop then converts water to steam in a second heat exchanger.

Other disadvantages of liquid sodium lie in its explosive reactivity with water, corrosiveness and possibility of erosion of piping and containers. Also providing means for remote maintenance of equipment in primary loops adds to the over-all plant cost.

Consumers Public Power District of Nebraska is constructing a 75 emw sodium-graphite reactor at Hallam. Experience there may indicate whether the advantages of liquid metal outweigh the disadvantages.

• **Fast-breeder reactor**—Sometimes neutrons, instead of splitting the nucleus of an atom, are captured by the nucleus. The original element is transmuted into another one. Thus it is possible to transmute nonfissionable thorium and uranium into fissionable uranium and plutonium. For this purpose, fast neutrons are desirable.

In a fast-breeder reactor, the core is composed of two regions. One contains nonfissionable thorium or uranium (the natural forms, which are many, many times more abundant in nature than the fissionable isotopes). The second region contains fissionable material that sends high-speed neutrons into the fertile region to transmute the isotopes there into fuel. There is no moderator because it is desirable to permit the high-speed neutrons to escape into the fertile region.

This type of reactor can produce more fuel than it consumes.

Because of the high power density of a fast breeder, liquid-metal cooling is preferred. Therefore this type of plant has many of the disadvantages of the liquid-metal-cooled reactor.

Two fast breeders are now under construction—the Enrico Fermi plant rated at 100 emw at Monroe, Mich., for Atomic Power Development Associates and one rated at 20 emw at the National Reactor Test Station, Idaho, for Argonne National Laboratory.

• **Gas-cooled reactor**—Gas may be used as a coolant instead of a liquid. Gas-cooled reactors can operate at low pressure and therefore can be built in very large sizes.

This type of system uses a minimum number of auxiliary systems for an indirect-cycle reactor. The heat-exchanging medium does not become radioactive, and no particular hazards are associated with its use. The big disadvantage is that the power density with natural uranium fuel and graphite moderator is extremely low.

The British are using carbon dioxide as the coolant. The heated gas is fed to a steam generator, then forced back to the reactor to complete the circuit. Reactors at Calder Hall of 35 emw capacity have been in operation since 1956. Several more are under construction in Great Britain; the largest is the 500 emw reactor at Hinkley Point.

One reactor of this type with helium as the coolant is being built at Oak Ridge. However, designs for several more are being developed, including one with nitrogen as the coolant.

• **Homogeneous reactor**—The reactors previously described differ from each other in types of moderator and coolant used, but they all isolate the fuel from those components. These reactors are called heterogeneous.

Another type, called homogeneous, has been operated on a small scale. The fuel is either dissolved in the coolant-moderator or is held in suspension. Heat is generated in a thick-walled, pear-shaped vessel, and the hot fuel slurry, pressurized to prevent boiling, is pumped to a steam generator, then back to the reactors.

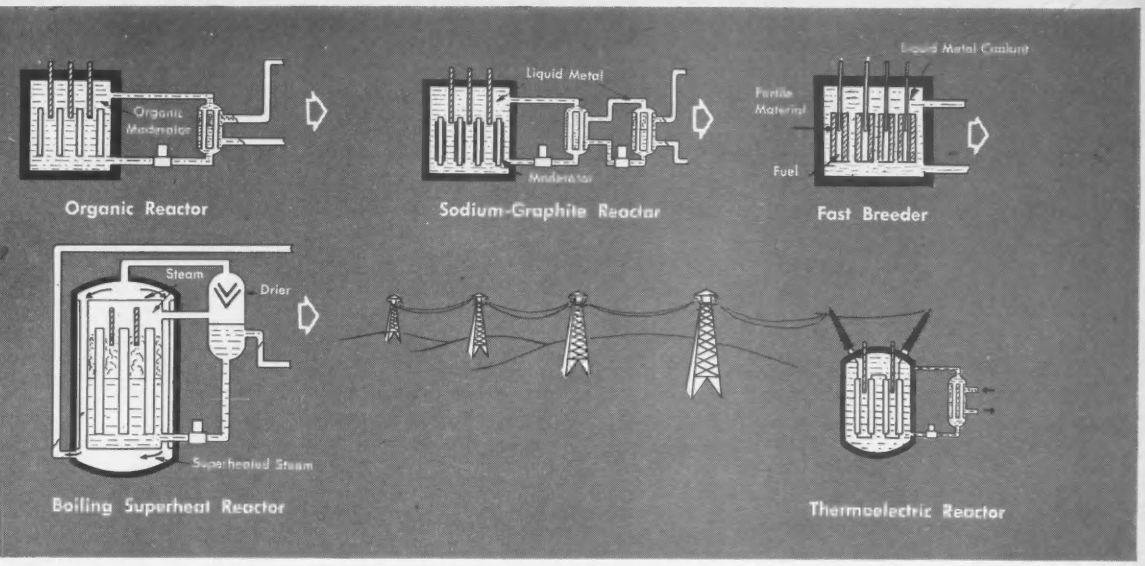
Big advantage of this reactor is the low cost of fuel fabrication and replacing "burned out" fuel. It also can be used as a breeder to convert natural thorium and uranium to the fissionable isotopes. However, it has a relatively high capital cost because of the thick material need for the pressurized system, the shielding required for the reactor, primary loop and steam generator, and the provisions that have to be made for maintenance of the radioactive section. It also has temperature limitations.

No large-scale homogeneous reactors are being constructed at the present time in the U. S., but studies are still being made.

• **Heavy water reactor**—Heavy water reactors are under investigation in Canada. In this type, heavy water, in which the hydrogen atoms are deuterium, H^2, instead of the more abundant isotope H^1, replaces ordinary water.

Good nuclear performance is anticipated. But the high cost of heavy water makes the capital cost of a heavy water plant relatively large, and the replacement cost of heavy water lost during operation also could be substantial. No large-scale heavy water reactors have yet been scheduled for construction in the U. S., but some are being studied.

• **Looking ahead**—Operating experience with these reactors is bound to result in



design improvements. But in addition to these, other improvements can already be anticipated.

For example, a pressure tube reactor may be developed as a variation of the pressurized water reactor. In this type, the fuel is enclosed in a number of tubes, instead of a single pressure vessel. Water (possibly heavy water) is circulated under pressure around the fuel and to a steam generator. The tubes in the reactor are surrounded by a moderator (water) not under high pressure. Hence, the containment vessel can be made of thin metal.

A boiling superheat reactor may be developed as a variation of the boiling-water reactor. Since power plants operate more efficiently with steam at high temperatures and pressures, and since the steam from the reactors previously described generally is at a relatively low temperature, even the newest of the nuclear plants have to operate at low efficiency or superheat the steam with fossil fuel. An obvious improvement, therefore, is to use nuclear energy to superheat the steam.

Construction now is under way on a 62 emw boiling superheat reactor for Northern States Power Co., at Sioux Falls, S. D. In this reactor, both superheater and boiler will be in the core, with the superheater in the center. Saturated steam, generated in the boiler region, will pass up through moisture eliminators to the top of the reactor. Then the steam will be drawn down through tubes containing the superheater fuel. Double-walled, the tubes will incorporate a thin layer of stagnant steam to insulate the superheated steam from cooler superheater moderator water on the outside.

Also, the following reactor types are being studied:

Fused salt—Based on use of a salt solution of fissionable and fertile materials, which is circulated from the reactor through an external heat exchanger. Potential advantages of this system are high thermal efficiency, low pressure and simplified fuel reprocessing.

Fluidized bed—A bed of fissionable and fertile material in a fluidized state under turbulent flow conditions. Organic material or water may be used as coolants. High power density and ease of charging and discharging fuel are potential advantages of this system.

Paste or suspended fuel—Similar to the fluidized bed, except that the bed is maintained in a laminar, non-turbulent condition and is internally cooled by a separate coolant. Many of the potential advantages of the fluidized bed are retained. Because of the non-turbulence, particle attrition is reduced and reactor control may be easier.

Supercritical water-cooled—Reactor operates at extremely high pressure, avoiding the phase change associated with boiling yet permitting generation of superheated steam external to the reactor. High-thermal-cycle efficiency is the potential advantage.

Slurry—A fluid-fuel system in which the particle size of the fissionable or fertile material is so small that it forms a suspension under operating conditions. The reactor may be cooled externally or internally. The carrier fluids undergoing most active investigation are water and liquid metals. Potential advantages of this concept are similar to those cited for other fluid-fuel reactors.

Advanced epithermal—A compromise design between sodium-cooled fast reactors and sodium-cooled thermal reactors, with some moderation by graphite or beryllium. High thermal efficiency and low pressure of the sodium-cooled system would be retained.

Pebble bed gas-cooled—A stationary bed of balls (or pebbles) containing the fissionable, fertile and moderator materials, cooled by a gas. Potential advantages are low fuel cycle costs and high thermal efficiency.

Solid-moderated, steam-cooled—Heat from the fuel is radiated to the moderator (graphite, beryllium oxide, zirconium hydride, etc.), which, in turn, is cooled by water or steam. High thermal efficiency is hoped for.

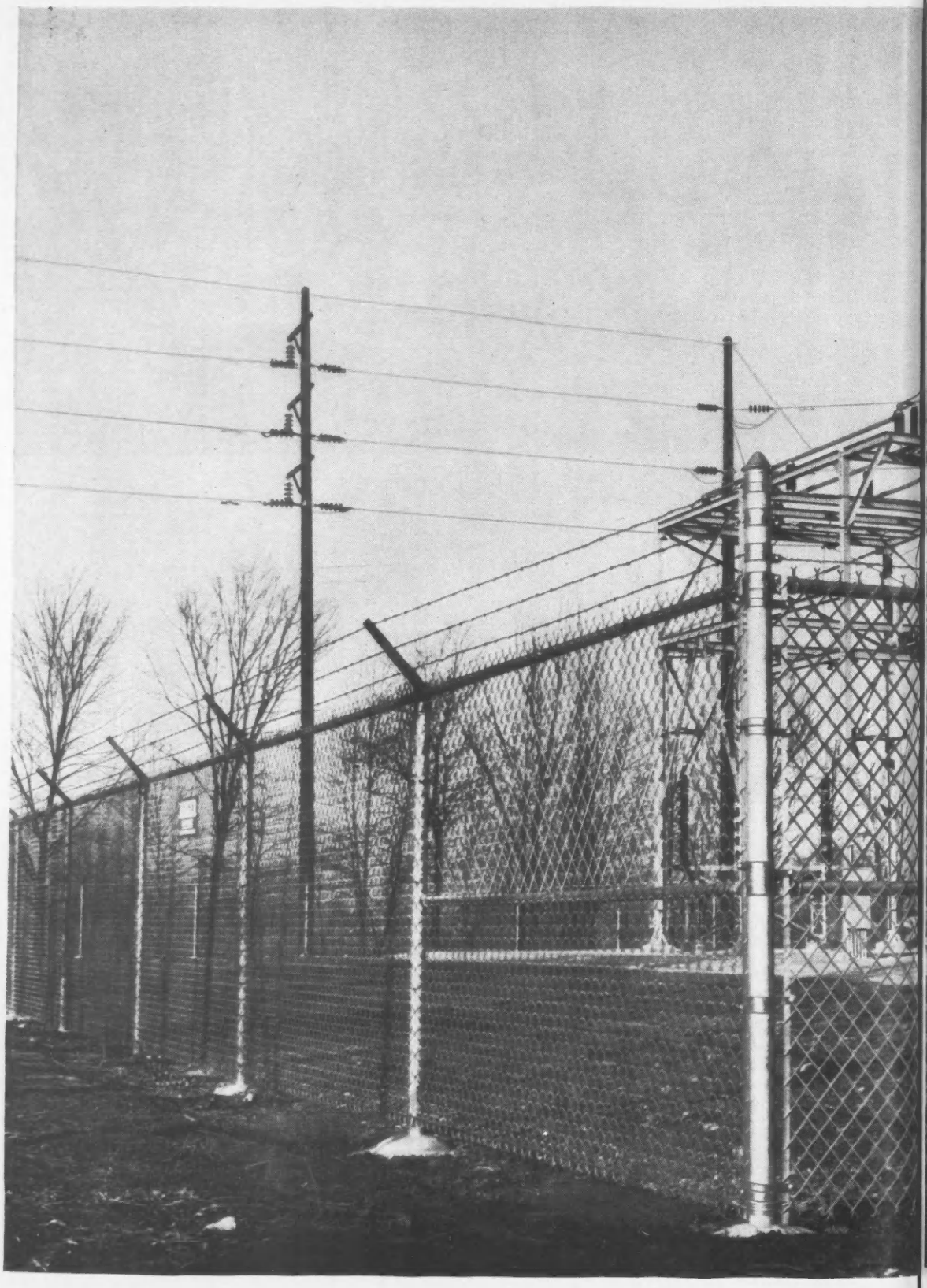
Alternate coolant fast reactors—Similar to the sodium-cooled fast reactor, except that alternate coolants, such as mercury, lead, lithium, sulfur, are being considered. Increased efficiency and reduced costs may be attained.

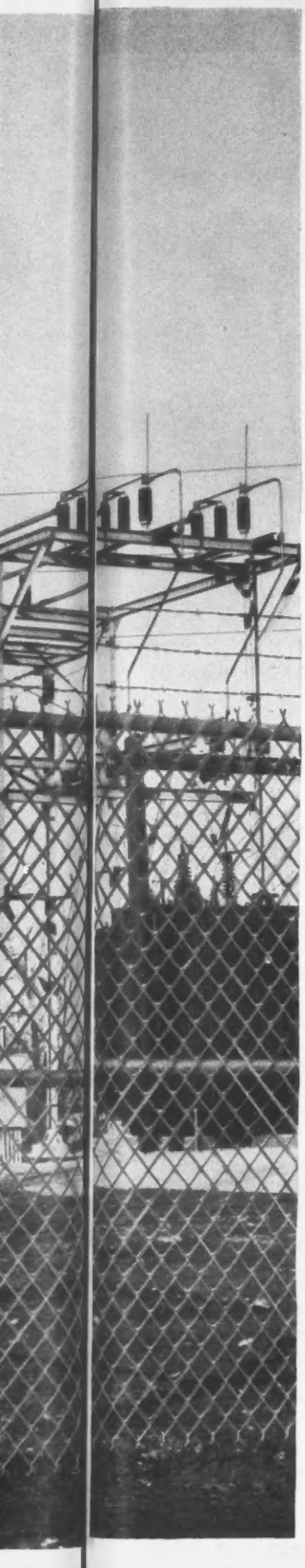
A real breakthrough would be development of a thermoelectric reactor. This would convert nuclear energy directly to electricity. It probably would utilize thermoelectric materials, which generate electricity when a temperature differential exists in them.

Studies also are under way to improve reactor containment. One system would use water as a heat sink and shield, the water absorbing the fast energy release of a "runaway" by condensing steam. It would offer higher safety at lower cost.

Other studies are aimed at developing effective methods of separating steam from hot water in the reactor. If the objective is attained, expensive and complicated external steam drums and separators could be eliminated. And still more studies are directed toward extended fuel life and lower fuel costs.

Many other types of reactors are conceivable. Those described here are the ones that appear to show the greatest promise for economical power.





Cost comparison leads Dayton Power and Light Company to Alcoa Aluminum Chain Link Fence

Today's high costs for painting and other maintenance are causing progressive public utilities to re-examine the long-term cost of protecting their properties with chain link fence. A major Midwestern gas and electric utility, The Dayton Power and Light Company, of Dayton, Ohio, recently selected Alcoa® Aluminum Chain Link Fence for erection at two installations.

Alcoa engineers working with utility engineers approached the long-range evaluation in this manner:

OBJECT: To find a fencing material which will provide adequate protection at reasonable initial cost and will retain its strength, appearance and durability with minimum maintenance.

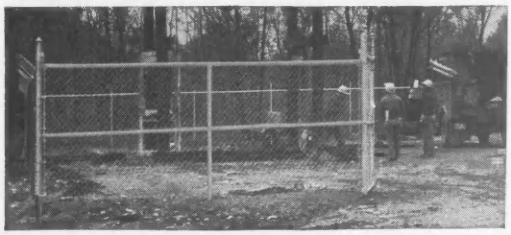
DATA:

Considerations	Galvanized Steel Chain Link Fence	Alcoa Aluminum Chain Link Fence
Height	7 ft	7 ft
Wire size	9 gage (0.148 in.)	9 gage (0.148 in.)
Appearance	Grayer than aluminum when new. Periodic maintenance necessary to retain original appearance.	Brighter and shinier than steel when new; protective oxide coating resists corrosion, retains silvery finish. Never needs painting.
Material cost per lineal foot (delivered price)	$2.25	$2.66
Painting cost* per lineal foot (at end of 10-year period)	1.35	—
Total cost after 10 years (per lin. ft)	3.60	3.38†
Total cost after 20 years (per lin. ft)	4.95 (min.)	4.10

*Based on total cost of wire brushing, cleaning, prime coat and finish coat, the minimal amount of maintenance necessary to retain strength and appearance of steel, plus escalation at 3½ per cent per year (includes labor, transportation and material).
†Includes interest of 16 per cent on premium involved in initial investment.

CONCLUSIONS: Aluminum chain link fence retains strength and appearance without painting. Maintenance of steel fence offsets initial premium paid for aluminum.

RECOMMENDATION: It is suggested that aluminum chain link fence be specified for all new installations. Further, that replacement with same be considered before any existing steel fence is again painted.



The Dayton Power and Light Company had Alcoa Aluminum Fence erected before construction began in order to safeguard valuable equipment.

◀ **The Dayton Power and Light Company** chose Alcoa Aluminum Chain Link Fence for this new electric substation at Centerville near Dayton, Ohio. Aluminum Fence Company of Cleveland was the supplier.

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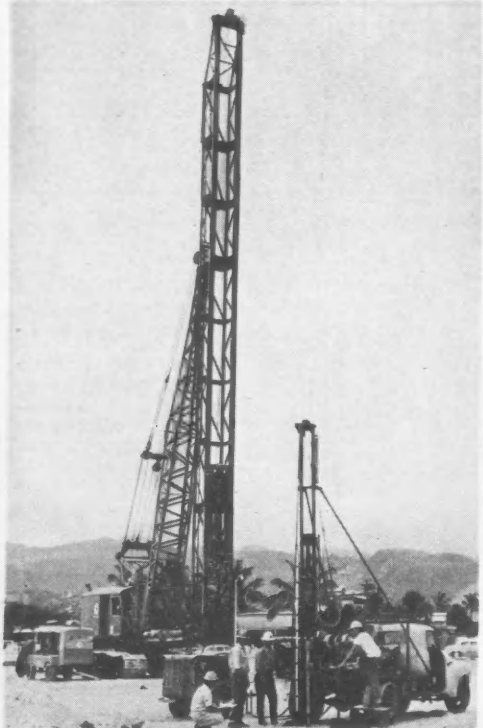
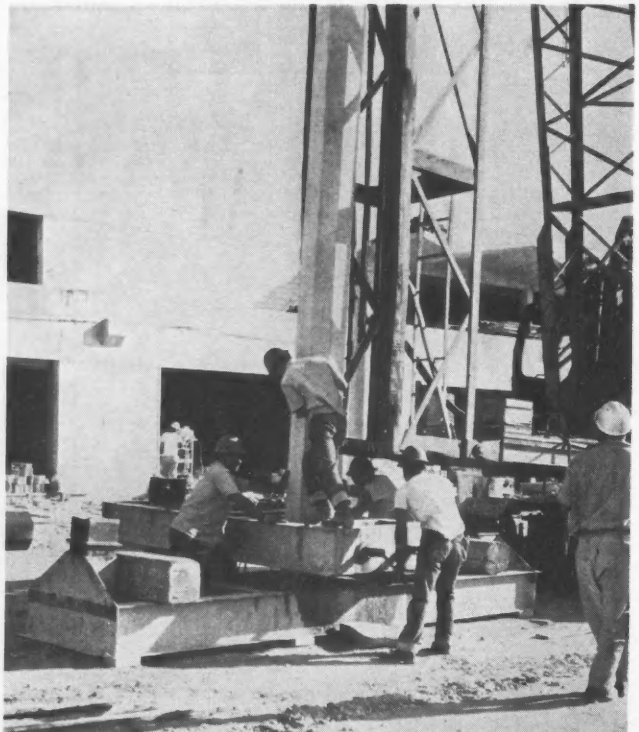
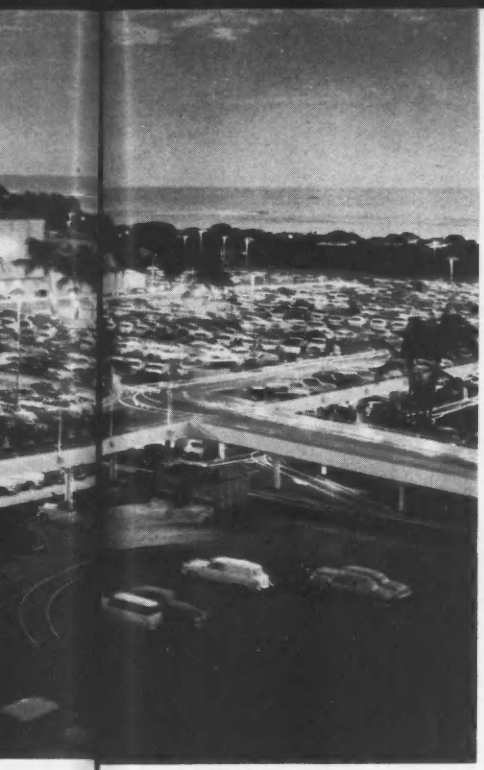


Miniature rig sets pile lengths.



Workers align pile with template screwjacks.



in background.

Cantilevered steel frames second-level store roofs.

Center a Story Above Grade

The owner-builders of Honolulu's giant Ala Moana Shopping Center solved difficult problems in getting their project off the ground. First they had to sell the idea to the area's merchants and arrange financing of the $38-million center before tackling their toughest construction problem: How to build foundations on a site where an excellent location was severely handicapped by miserable sub-soil.

Located halfway between downtown Honolulu and the Waikiki area, Ala Moana's 56 acre site is within 15 minutes driving time of nearly half of Hawaii's 600,000 inhabitants.

For 50 years the reclaimed swamp has been a dumping area for dredged fill. A 5-ft surface layer of coral fill lies over a 15- to 20-ft layer of mud and sand. Underlying reef coral of varying bearing capacity traces an irregular profile.

The two-level plan dictated by the high groundwater level has certain advantages in shopping-center design under any conditions. Providing parking at street level and shopping areas at an upper-story mall, it results in a more compact layout than conventional suburban shopping centers. The poor subsoil combined with the high groundwater level led to the use of piles that would also serve as one-story columns.

Two specific problems confronting

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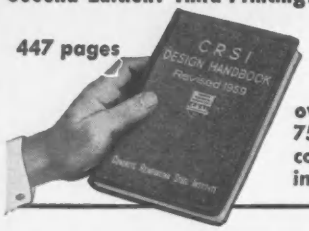

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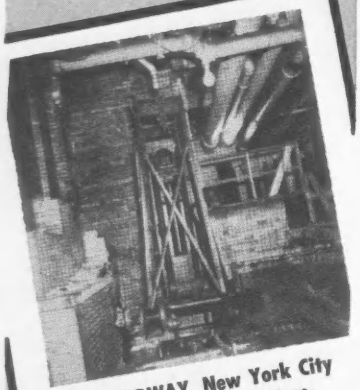

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Driving 40' open end piles in sub-basement. Only entrance 3' x 4'. 12' headroom.

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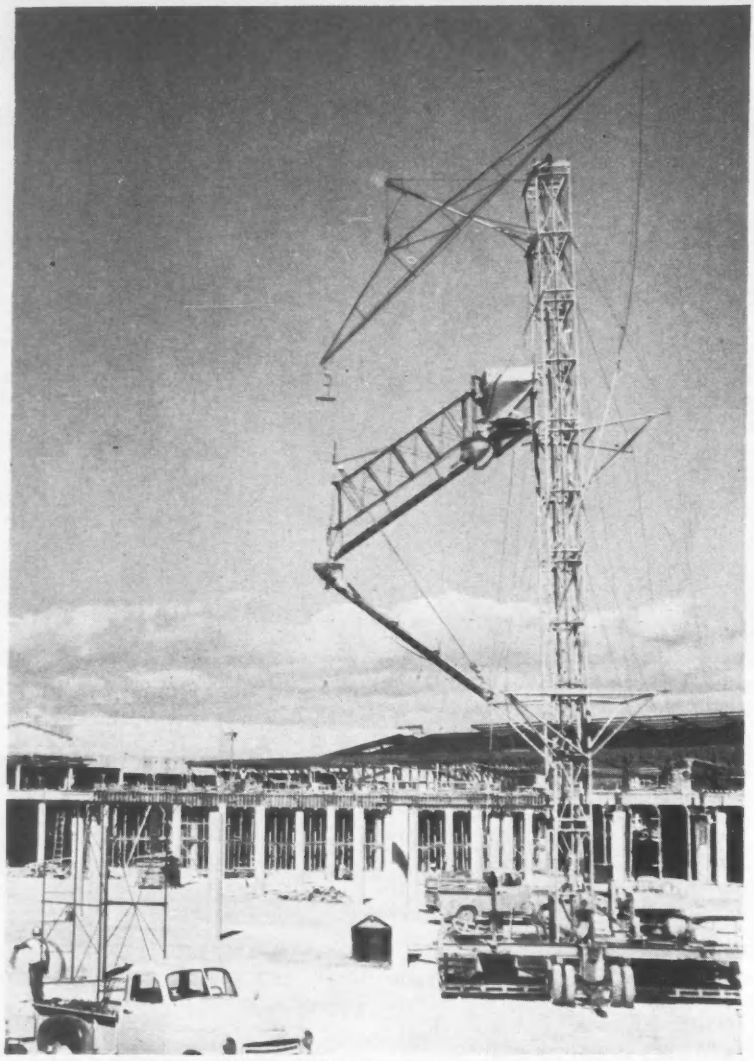

TRAILER-MOUNTED TOWER HOIST lifts concrete to hopper which feeds chutes.

the builder in driving the prestressed concrete piles were:

- How to determine pile lengths before driving.
- How to maintain the close driving tolerances imposed by the dual function of the piles as columns.

Use of a miniature pile-driving rig solved the first problem. The uncertain sub-soil and the irregular profile of good-bearing stratum made it necessary to pretest each pile location. The miniature rig drives 2½-in.-dia extra-heavy-duty pipe, capped at the bottom and fabricated with flush joint couplings. Hammer force of the miniature rig is computed to produce the same pressure per square inch as the Vulcan steam hammer produces driving the permanent piles. Signal to stop driving was attainment of 10 blows per in.

Driving records of the permanent piles showed close correlation with the records of the miniature rig. Only 5% of all pile lengths were over the 6-ft target tolerance.

Special template enabled the contractor to maintain the close location and alignment tolerances: 1 in. maximum variation from plan location and 1 in. maximum out of plumb in its 14-ft column height. The template consists of two steel frames made up of WF-sections, crossed at right angles. After it is set in approximate position, the pile rig drives steel H-sections some 6 ft into the ground as braces for the template. Workmen then locate the pile exactly by adjusting screwjack-driven plates at two elevations. After driving the precast pile, the pile driver withdraws the H-sections.

Driving lengths generally ranged from 25 to 50 ft. But some piles went nearly 180 ft down. As the maximum casting

(*Story continues on p. 46*)

5 reasons why Atlas Copco's "TIGER" is best for stoping and all short-hole drilling!

(1) It's fast and easy to handle!

(2) It's easy collaring, with little recoil!

(3) Features a retractable air leg!

(4) Convenient controls, automatic back head!

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This isn't the whole story by any means. For more facts about the amazing new Tiger rock drill and how it can speed *your* drilling, call your nearest Atlas Copco representative. Or, write to us at Dept. ENR-10.

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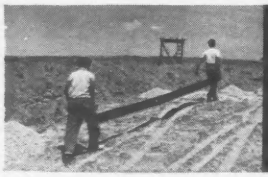

b

c

a 20-foot sections of Armco Perforated Pipe are handled by two men.

b Strong, tight joints are quickly made with coupling bands and bolts.

c Well-graded sand is recommended backfill for most subdrainage systems.

This Headache

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Unwanted ground water in the subgrade reduces the load-carrying capacity of the soil. Result: pavements can't carry the load. They fail. Maintenance costs go up and up.

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Here's why Armco Perforated Pipe is a better way to build those subdrains: Infiltration area is controlled. Water is admitted through rows of strategically placed holes in the lower third of the pipe. These holes are large enough to collect water, small enough to exclude solids. Tight joints of Armco Pipe are important, too. Solids can't enter at the joints.

Installation, too, is simplified with Armco Pipe. Long, 20-foot lengths reduce the number of sections to be hauled, handled and installed. For the complete story on ground water control, use the coupon. Or write us, outlining your subdrainage problem. Armco Drainage & Metal Products, Inc., 5020 Curtis Street, Middletown, Ohio.

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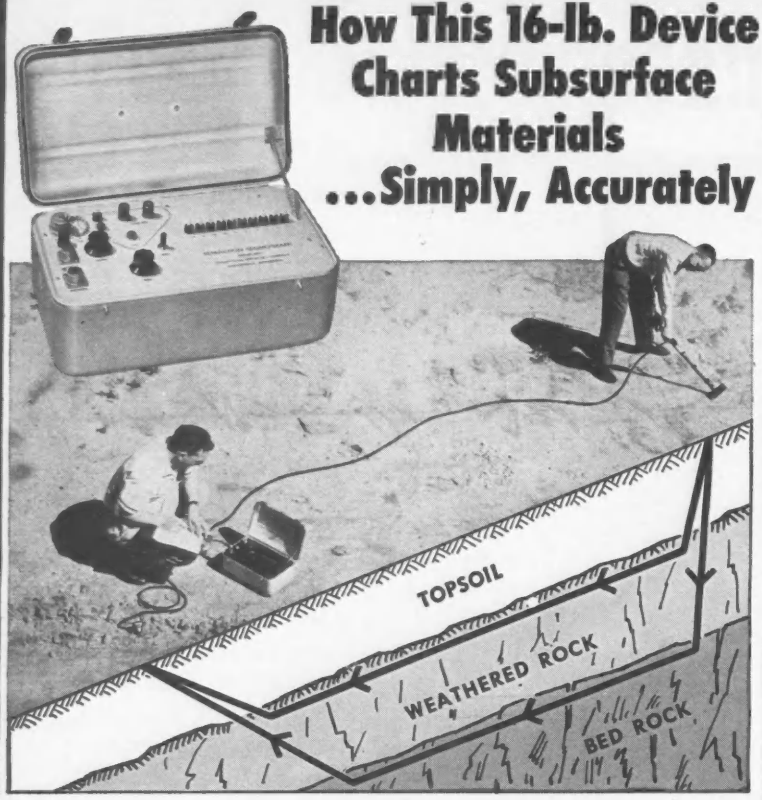
How This 16-lb. Device Charts Subsurface Materials ...Simply, Accurately



That vital first step before you locate a highway or bid an excavation —providing acourate information about depth and type of materials below the surface—is far simpler and less expensive with this proven device, Geophysical's model MD-1* Engineering Seismograph.

It's easily portable, providing immediate information anywhere two men can go. Costly exploration crews and equipment are not required. And data obtained is not limited to single points as in drilling, but can cover the entire area of operation.

HERE'S HOW IT WORKS:

The sledge hammer produces sound waves which travel through the earth. The MD-1 measures the time required for the sound to travel a given distance. This time is determined by the depth and type of the material; the denser the material, the faster the sound waves travel. For example, sound travels slowest through overburden, faster through clay or weathered rock and still faster through solid rock. In this way, the MD-1 can determine single or multiple layers.

See how simply you can obtain your vital subsurface information with this Engineering Seismograph. Operate it yourself after a few minutes simple instructions. Demonstrations are now being scheduled on a regional basis. Write for full details. *Patents pending

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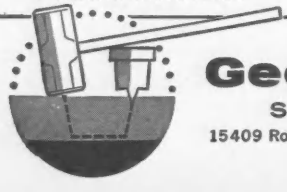

Geophysical
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. . . Honolulu shopping center

length was 60 ft, these required splicing.

Precasting crews cast dowel sleeves 3 ft into the piles. They grouted in No. 9 rods, either for splicing or for anchoring the pile to the column cap. A ½-in.-thick steel plate was welded around the spliced section, extending 3 ft beyond each side of the joint.

In a few instances, piles reached good bearing at a higher elevation than that indicated by pretest driving. These were cut off, drilled and doweled in the same manner as the spliced piles.

The precast pile-columns are octagonal in section with two sizes:

- 18-in.-dia units, prestressed with 21 ⅝-in. cables and designed for 125 tons. These support buildings at the mall level.
- 16 ½-in.-dia units, prestressed with 16 ⅜-in. cables and designed for 75 tons. These support the parking deck.

The contractor tested the piles with a test load of twice the design load, in conformance with the Uniform Building Code.

Framing for the mall level consists of prestressed girders and beams, precast on the site, and ribbed concrete floors, cast in place. The girders frame bays 30 ft square at the parking deck and 24 ft square in the shopping area. They are inverted tees, 20 or 24 in. deep, pretensioned with straight and harped tendons. The prestressed beams bear on the flange lugs at the bottom of the girders.

The beams are rectangular in section, either 6 x 8 in. or 8 x 14 in. Steel angles bolted to the beam sides carry the soffit board and the metal pans forming the ribbed slab. Workmen strip the forms merely by loosening the bolts holding the steel angles, removing the angles, and letting the pans drop from under the cast slab.

Special metal forms, clamped over the pile-columns, form bracket seats for the prestressed girders and the column sections from pile tops to floor level. The heavy-gage steel bracket forms must support the girders while the deck is being formed and cast. The column sections, girder brackets, and floor slab are cast in a monolithic pour.

Slab-casting rate of a 60-man crew reached a peak of 60,000 sq ft per week. This speed can be partially attributed to a tower hoist, mounted on and guyed to two trailers that are locked together. The tower hoist lifts concrete from the transit-mix trucks on the ground to a tower-mounted hopper, which discharges into concreting chutes. The chutes can swing over a wide area.

Construction in the early stages proceeded at a much slower pace. Before the prestressed members were available, conventional piles and reinforced con-

Revere Copper Water Tube in Triple Win at SQUAW VALLEY

Used in Athletes' Dormitories, Officials' Housing and Spectator Buildings for the VIII Winter Olympic Games

ONE OF TWO SPECTATOR CENTERS—These 9-sided buildings with walls of glass provide all the comforts of home and then some, from banks to beauty parlors. Both are served by non-rusting, enduring Revere Copper Water Tube.

CENTER OF ATTRACTION—at VIII Winter Olympic Games where worl top athletes from 34 nations are competing for supremacy in figure skati and ice hockey.

TWO OF THE DORMITORIES that house over 1,000 athletes that are competing in the games.

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VANDAMENT-DARMSTED, Mech. Engs.—San Francisco, Calif.
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When plans were made for the United States to entertain 33 other nations at Squaw Valley, Tahoe City, California, naturally those plans called for putting our Nation's best foot forward. For the world's top athletes must have at their disposal the best available equipment and accommodations.

25,000 ft. of Revere Copper Water Tube were used for hot and cold water lines and convector heating in the Athletes' Dormitories, Officials' Housing and Spectator Buildings. Both "K" and "L" were used, in sizes of ½" through 2", by W. L. HICKEY SONS, Plumbing Contractor, and furnished by TAY-HOLBROOK INC., Revere Distributor.

With copper on the job, not only will the more tha 1,000 athletes and hundreds of thousands of spectators a the VIII Winter Olympic Games receive dependable serv ice, but additional thousands of winter sports fans ca continue to enjoy the reliable performance of copper fo many, many years to come.

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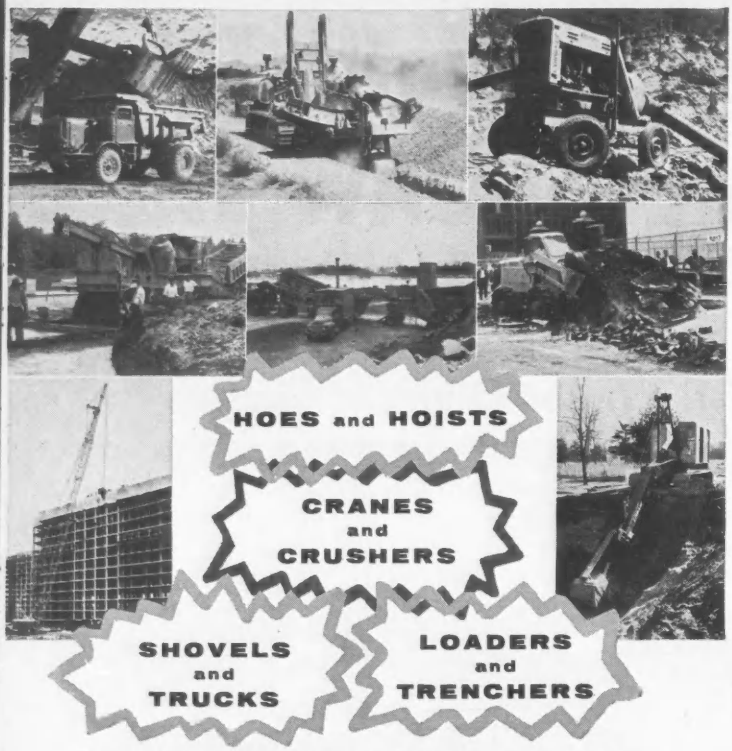

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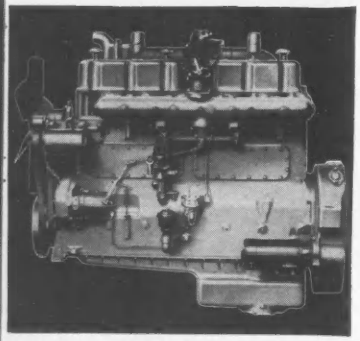
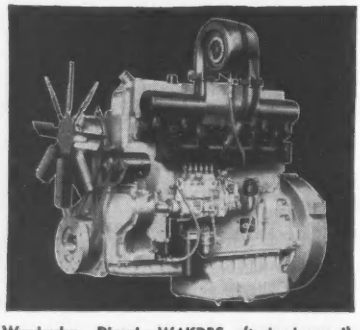


Waukesha gasoline engine—145-GZB—5⅜" x 6"; 817 cu. in.; 240 max. hp. Other models, 50 to 980 hp; bare engine or complete power units.



Waukesha Diesel—WAKDBS (turbocharged) 6¼" x 6½", 1197 cu. in., 400 max. hp. Other models, 50 to 1235 hp; bare engine or complete units; normal or turbocharged.

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

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. . . Honolulu shopping center

crete floor framing were used. A 200-man crew cast only 14,000 sq ft of slab area per week, using this framing.

An on-site precasting plant furnished all the prestressed elements for the job-piles, girders and beams. The plant is designed for subsequent removal to another construction site.

The plant comprises four beds: one 450-ft bed for piles, two 250-ft beds for beams, and one 250-ft bed for girders. All beds get two daily castings, producing 900 linear ft of piles, 1,000 lf of beams, and 500 lf of girders per day. All precast members are steam-cured.

Framing of the buildings above mall level is generally of light structural steel.

Phase 1 of Ala Moana's construction, now complete, contains 675,000 sq ft of store and office space and parking space for 5,000 cars. Phase 2, scheduled to begin within a year, will bring the total to 1.2 million sq ft of rentable space and parking capacity for over 7,000 cars.

Access between the two levels is of all kinds: elevators, moving stairs, conveyer belts, stairs and dumb waiters. Many stores occupy the two levels; almost all of them face the pedestrian mall and the parking area at mall level.

There are no back doors at Ala Moana. Truck deliveries and trash collections are made at a concourse that is located at street level and is completely out of sight.

Another major feature of the project is the tallest prestressed concrete building in the U. S. Now under construction, the 25-story office building towers 300 ft. Its $5-million cost is included in the over-all $38 million for the entire project.

Architect is John Graham & Co., Seattle and New York City, which designed the nation's largest shopping center, Lloyd Center in Portland, Ore., (ENR Sept. 3, 1959, p. 40). With Ala Moana, Graham can also claim the runner-up prize.

Park and Yee of Honolulu did part of the structural design.

Hawaiian Land Co. is promoter, owner and builder. It is a wholly-owned subsidiary of Hawaiian Dredging and Construction Co., Ltd., oldest and largest constructors in the Pacific area. Most of the construction staff of Hawaii Dredging transferred to Hawaiian Land Co. for the Ala Moana project.

C. W. Watson was project manager; Hideo Murata was field superintendent; and Robert Fields was chief project engineer.

Ben C. Gerwick, Inc., of San Francisco, designed the portable prestressed concrete plant.

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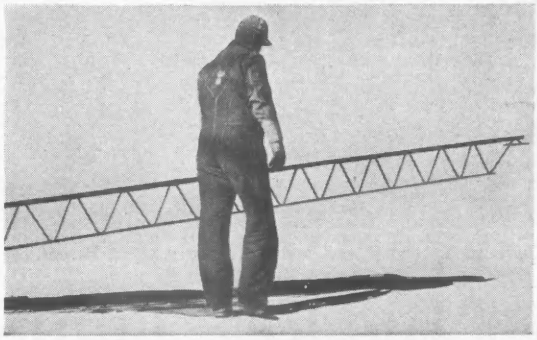
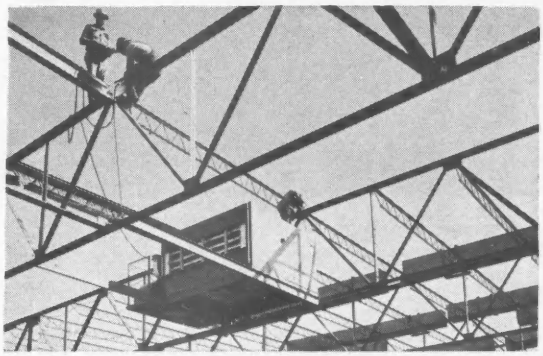


Light weight of Sheffield Joists makes them easy to handle. High strength-to-weight ratio makes possible big savings in construction costs and time.



Quickly installed, Sheffield Joists furnish a working platform right away. No temporary framework necessary. Other building trades proceed without delay.

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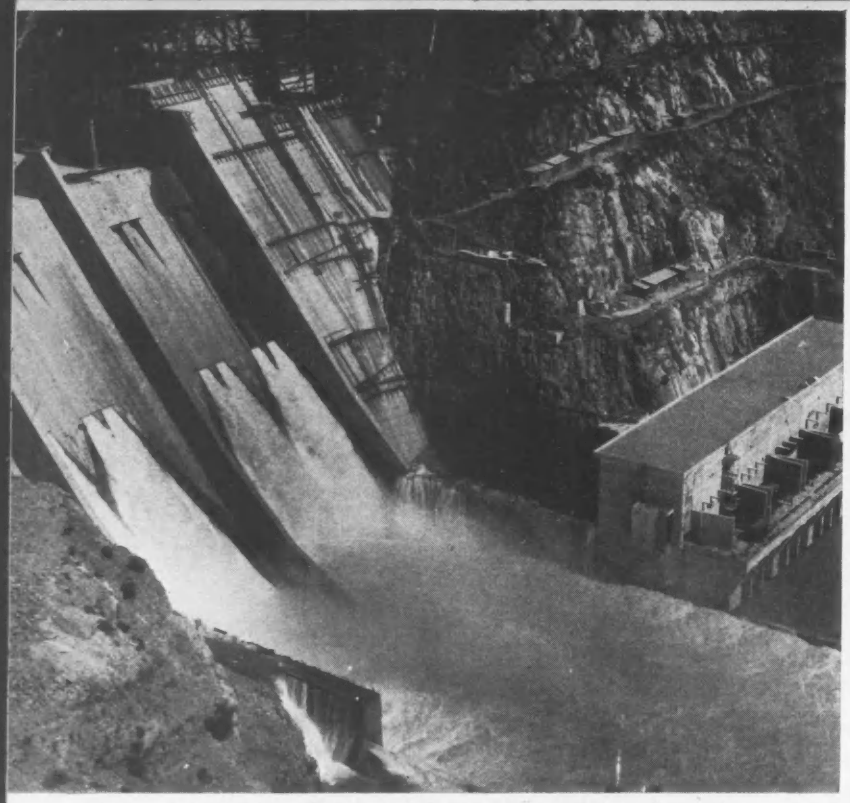
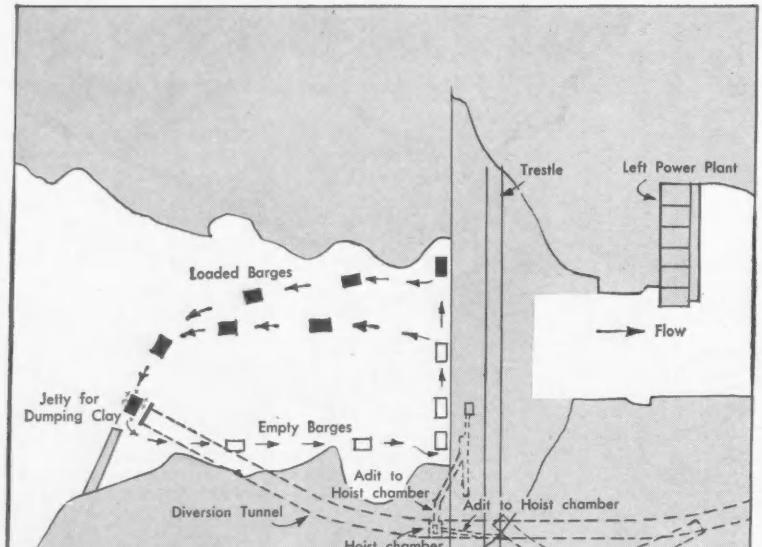


Dam progress is stalled until damaged tunnel is plugged.

To plug intake, steel and burlap

Bhakra Tunnel: Flow Is Almost



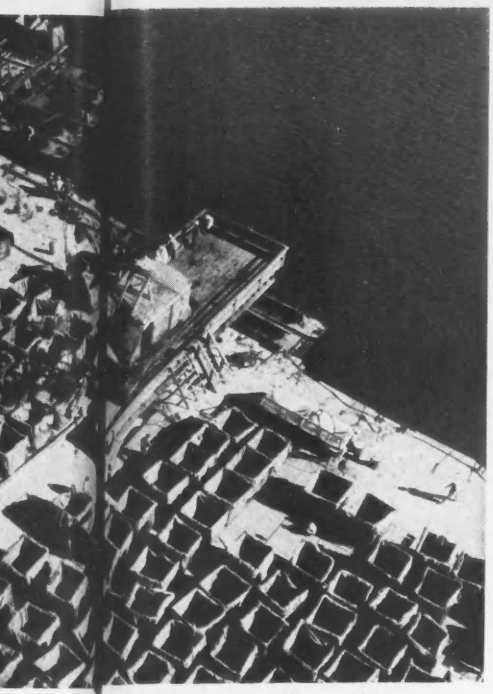
Barges load at dam face, circle counterclockwise to intake.

Success seems likely for the first phase of the big repair job at India's Bhakra Dam. Flow through the damaged right bank diversion tunnel has been cut from about 9,000 cu ft per sec to less than 400 cfs in the three and a half months since the attempt to plug the tunnel intake began.

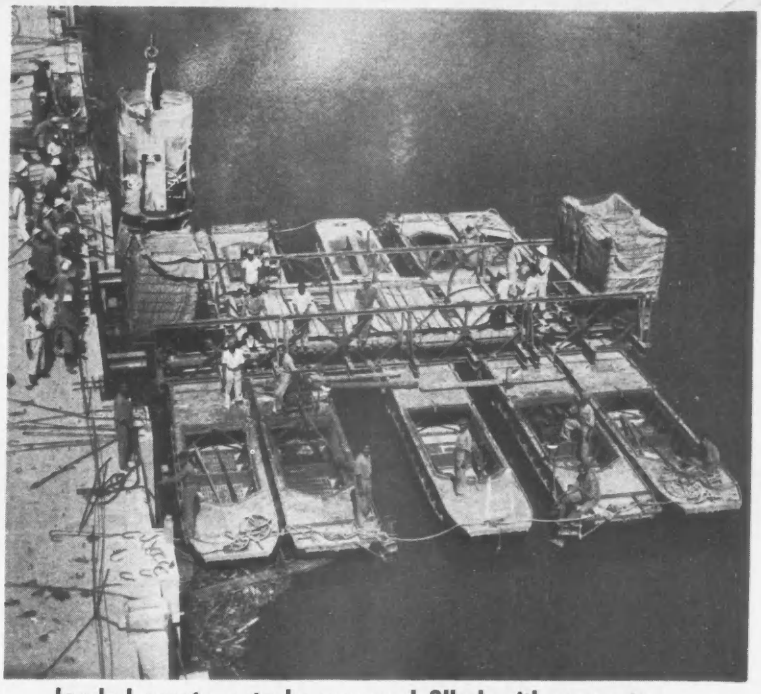
The main job is simply to seal the right bank tunnel—but permanently, since it is no longer needed. The difficulty, however, has been the high head of water at both the intake upstream from the dam and the gate chamber where the break occurred last August and flooded the dam's galleries and powerhouse (ENR Sept. 3, 1959, p. 23 and Oct. 15, 1959, p. 23).

First in the series of operations aimed at permanently sealing the 50-ft diversion tunnel is a massive dumping operation to plug the tunnel intake. Since early October, Indian Army engineers and Bhakra Dam construction personnel have dumped about 100,000 cu yd of concrete, rock, sand and pozzolan and close to 300,000 cu yd of clay. And in late January, a towering section of right bank, riddled with loaded coyote holes, was blasted into the reservoir near the intake to supplement the dumping.

Operations have continued around the clock. Precast concrete blocks, rock,



crates are made on dam . . .



. . . loaded empty onto barges and filled with concrete . . .

Shut Off

plastic concrete crates, aggregates of different sizes, and clay have been dumped in regular layers.

Simultaneously the reservoir level has been brought down from 230 to 130 ft above the tunnel intake.

All rock and concrete have been dumped from barges handled by four companies of Indian Army engineers.

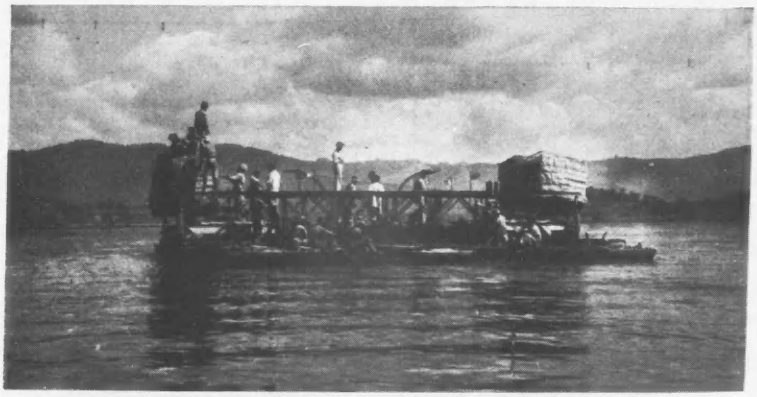
The barges consist of pontoons lashed together in groups of five and fitted with a Bailey-bridge type structure amidships. At each end of the bridge is a trigger-operated tilting platform that can handle 20 tons. Four outboard motors propel the assembly.

For dumping gravel and sand, the tilting platforms were converted into boxes with side doors.

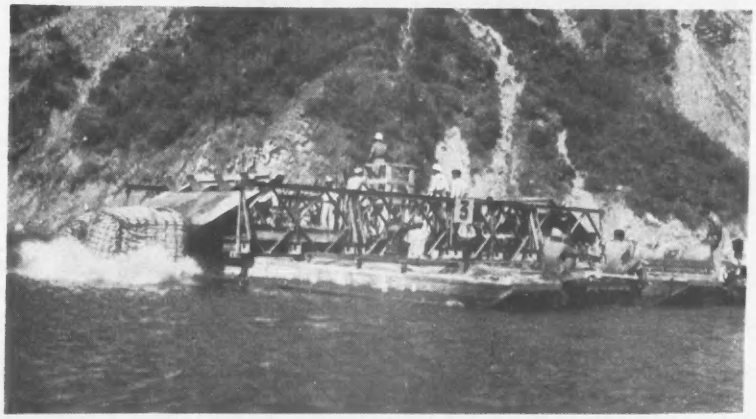
Clay is being trucked to the site and dumped from a jetty extending out from the right bank about 150 ft from the tunnel intake.

Mixing and barge-loading operations are set up on top of the completed blocks of the dam. The barges move to the upstream face of the dam to pick up loads, then make a wide sweep up the left bank and across the reservoir to the vicinity of the tunnel intake. Markers suspended from overhead cables pinpoint dumping locations.

The tunnel intake has a heavily reinforced portal structure of conventional



. . . floated to dumping site by Indian Army engineers . . .



. . . then toppled into the reservoir over the tunnel intake.

design with wing walls upstream (see photo). A few feet upstream from the portal is a gravity-type overflow dam with a horizontal crest at the elevation of the tunnel centerline. A trashrack comprised of 4-ft-deep steel members is concreted into the dam and the top of the portal.

Trashrack openings are 6 ft 10 in. by 8 ft. The rack is designed for a differential head of 30 ft.

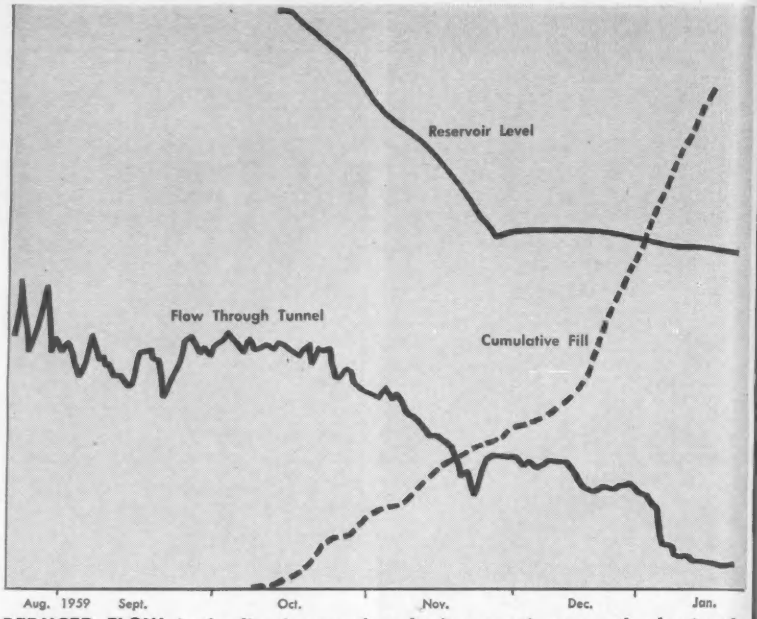
The plastic concrete "crates" consist of 5x5x6-ft containers made of steel rods, wire net and burlap and filled with fresh concrete. Dumped before the concrete sets, the crates conform to the surface on which they land. Then they harden.

The crates are fabricated on the dam, placed empty on the barges by crane and then filled from 4-cu yd buckets. While the barge moves to the dumping site, workmen sew the burlap together over the concrete and fasten on the steel road-and-wire tops of the crates.

Concrete blocks ranging up to 6½-ft cubes were precast on every available space on the dam and dumped also.

At the peak of activity, two cantilever cranes, one revolving crane and three crawler cranes handled materials on the dam; a truck crane handled 18-in. stone and sacks of pozzolan on the right bank; five 2½-cu yd shovels, two bulldozers and 20 dump trucks quarried and dumped the clay.

Up to January 19, about 275,000 cu yd of clay had been dumped and probably 200,000 cu yd more were to be dumped in the continuing operation. According to Harvey Slocum, construction consultant on the project, about 800 cu yd of clay per day is washed away through the tunnel. During the early part of the clay dumping, the loss caused flow in the tunnel to fluctuate sharply.



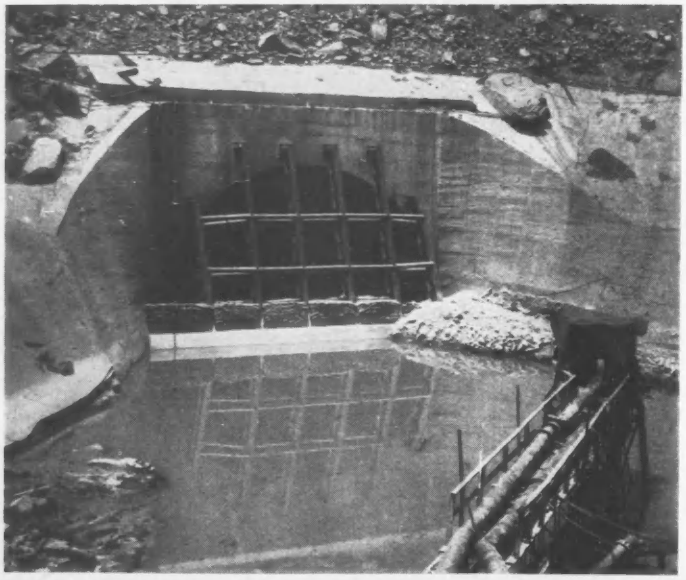
REDUCED FLOW in the diversion tunnel results from two factors: partly plugging the tunnel intake and lowering the water level in the reservoir.

Heavy dumping would bring rapid drops in flow volume, but holdups for bad weather or other reasons produced corresponding increases.

Location of the dumped material on the bottom has been checked regularly by Indian Navy and Bhakra Dam personnel, using echo sounding equipment. Water velocity, however, has made accurate sounding impossible in the immediate vicinity of the tunnel opening.

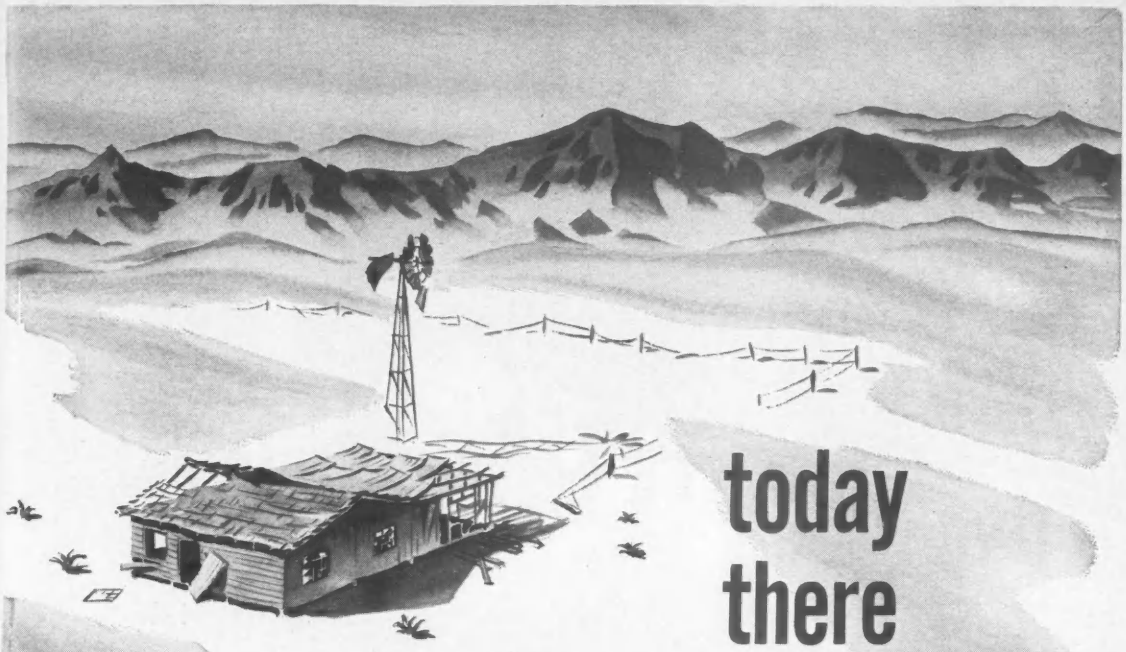
Complete closure of the tunnel intake is hoped for by April. Next step to be completed, under way now, will be driving of an adit to the gate chamber from an existing railway tunnel downstream. The old tunnel was used earlier in concreting the dam.

Eventually the gate chamber and gate hoist chamber above it will be filled with concrete (see drawing, ENR Oct. 15, 1959, p. 23).



TUNNEL PORTAL, shown before reservoir buildup, was under 230 ft of water when break occurred, is still under 130 ft. The job is to plug it.

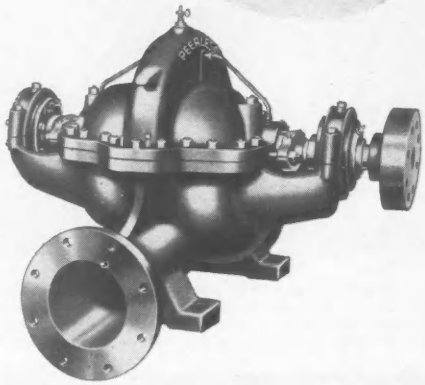
DIVERSION TUNNEL must be concreted solid from downstream end (above) to gate chamber.



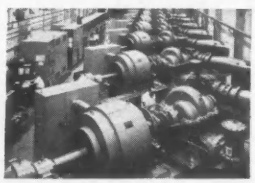
today there stands a city–

Where once, because there was no water, this farm failed. Helping supply water to municipalities everywhere are Peerless Type A centrifugal pumps. These horizontal work horses of the general purpose pumping field combine all the features necessary to outstanding, dependable pump performance. Split case design provides easy maintenance and inspection without disturbing piping. Superior hydraulic characteristics provide a capacity range of up to 70,000 gpm and a head range to 300 ft. A Type A's overall design efficiency and quality construction endow it first with a measurably longer service life and second with job versatility that qualifies it for nearly every pumping requirement your system may call for.

Get the finest–get the Peerless Type A horizontal centrifugal pump.



PEERLESS PUMPS



WRITE FOR BULLETIN NO. B-1300

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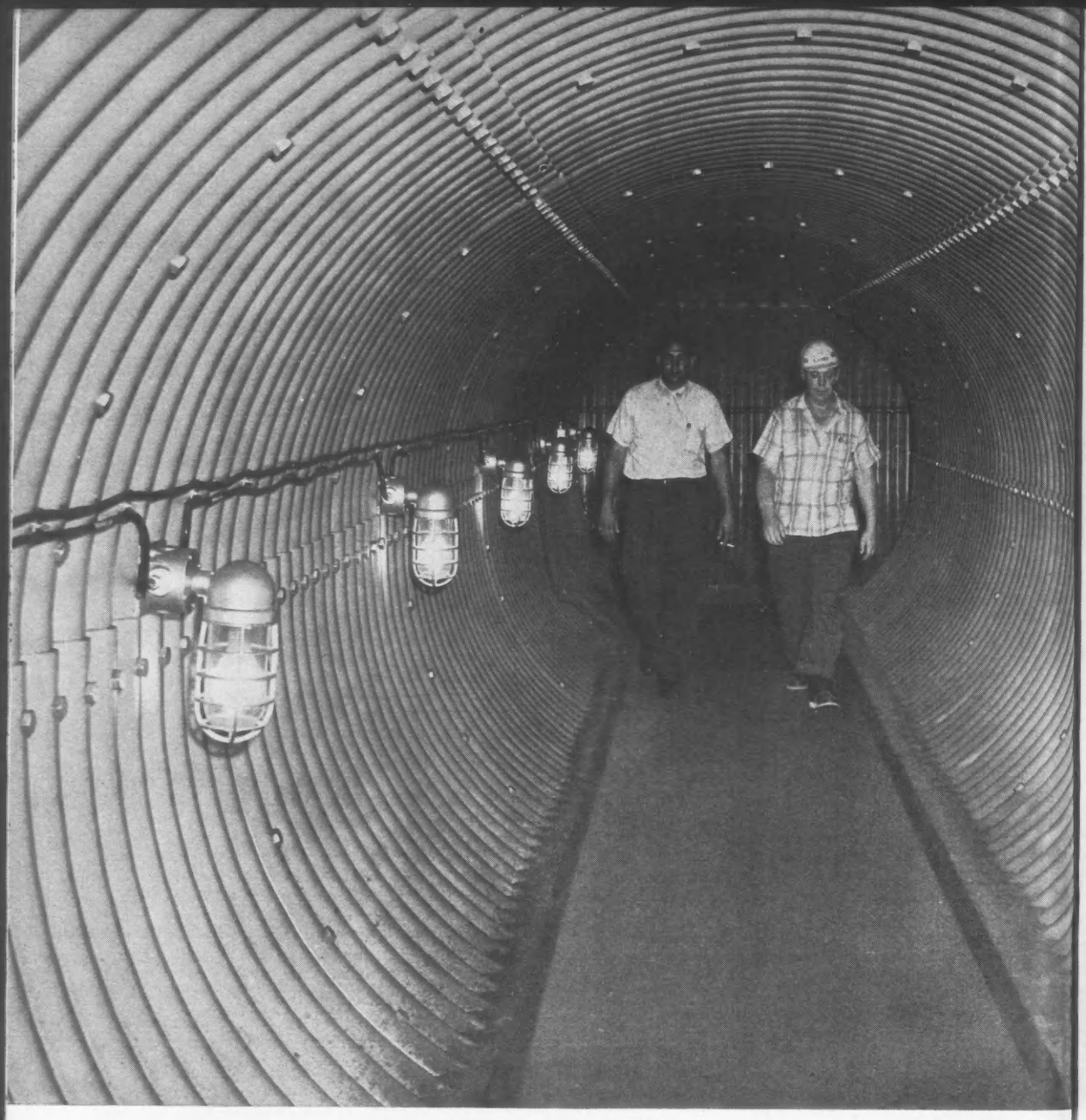
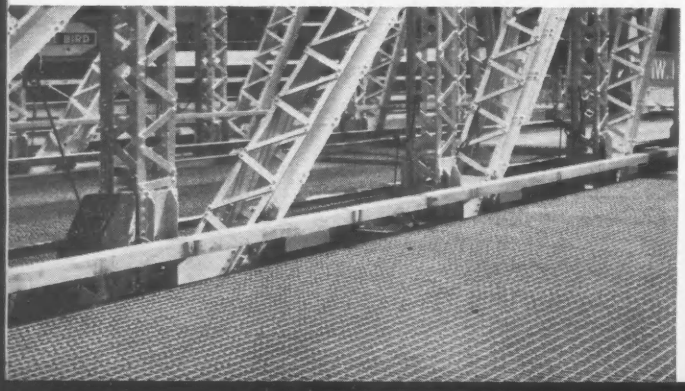
Peerless Pump Division

Plants: LOS ANGELES 31, CALIFORNIA and INDIANAPOLIS 8, INDIANA

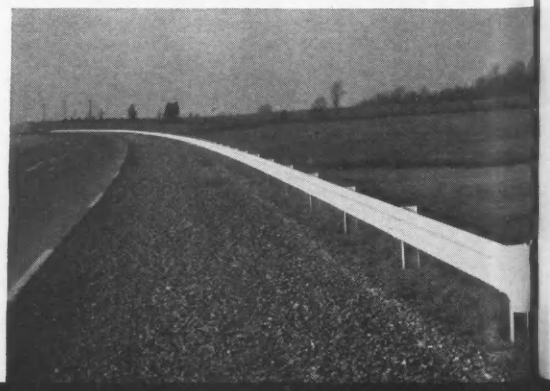
Offices: New York; Cleveland; Chicago; St. Louis; San Francisco; Atlanta; Plainview; Lubbock; Phoenix; Albuquerque; Los Angeles; Fresno. **Distributors in Principal Cities.** Consult your telephone directory.



USS AmBridge I-Beam-Lok is a sturdy, lightweight bridge flooring. It installs quickly and easily with few interruptions. The filled type is available in units 6′ wide and up to 49′ long that apply directly to stringers on spans from 6′ up to 8′ centers. The open type is also available for spans up to 4′ long.



USS AmBridge Highway Beam Guardrail and Posts help safeguard t
This rugged, flexible steel beam guardrail is highly visible. It bolts
but firmly to steel posts and is available in 25′ lengths to minimize sp



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This is a people pipe

This passenger underpass was fabricated from USS AmBridge Sectional Plate—normally used for drainage structures. It's buried 10-feet below the railroad tracks at the Philadelphia Electric Company's Eddystone Station near Philadelphia, Pennsylvania. □ USS AmBridge Sectional Plate was an ideal choice for this underground passageway, because it won't crack. Won't break. It's a permanent steel structure. It was easy to erect . . . there was no need for forms. AmBridge Sectional Plate comes in a complete range of sizes. And, it's fabricated to meet all federal and state specifications. Write or contact any one of our offices for literature and information on American Bridge Highway Products.

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USS

There's a reason WHY in MacWHYte Wire Rope*

It brings out the best in your equipment!

Just as you use specialized equipment for a particular job, it pays to use the right kind of wire rope designed for that equipment.

All wire rope isn't the same. There are changes in the construction of wire rope... which aren't obvious to the eye... but can seriously affect the way it will work on your equipment. Because all equipment isn't the same, different types of rope are required because of basic design variations.

With this in mind, you can see the reason "why" Macwhyte offers such a wide variety of wire rope:

* Every foot of wire in Whyte Strand is specially drawn, cold-worked by Macwhyte in their own wire mill. Complete processes — from raw material to finished wire for rope — are under the watchful eyes of Macwhyte metallurgists.

* Special lubrication is available in accordance with the needs of the equipment or the type of service in which the rope will be used. The tenacious lubricants provide just the necessary protection — are unaffected by heat or cold, dry or wet conditions.

* Product engineers determine the exact number, size, and relationship of the wires needed to meet the requirements of your equipment. You're sure of the correct size, strength, and flexibility.

* Entire wire and rope mill operations are concentrated on the making of wire rope in a thousand and one sizes, grades, and types . . . to give you the rope you need.

Result: Whyte Strand wire rope is literally "custom made" for shovel hoist rope, dragline, clamshell crane rope, boom hoist line, dozer rope, scraper rope, contractors' hoist and derrick rope, overhead cranes, cableway excavators, and winch lines. If you'd like to check the type of rope recommended for your equipment, send for bulletin 5702 — free for the asking.

191

MACWHYTE Wire Rope COMPANY

2900 Fourteenth Avenue, Kenosha, Wisconsin, U. S. A.

VOGELGRUN POWER PLANT and navigation locks, just completed, mark end of first stage work on France's Grand Alsace Canal.

New Plan Begins for Upper Rhine River

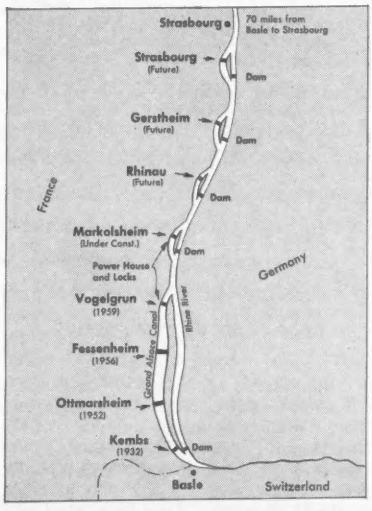
With completion of the power plant and locks at Vogelgrun and the start of the next similar facility downstream at Markolsheim, France's Grand Alsace Canal project—to develop power and improve navigation on the upper Rhine River—enters a new and originally unforeseen phase.

Born in the reparations agreement between Germany and France following World War I, the project envisioned a major navigation canal paralleling the Rhine on the French side and equipped with eight power plants to develop the 350-ft head in the 70-mile reach of the river between the Swiss border city of Basle and Strasbourg, France. About 30 miles of the canal and four power plants are now in service. The project is under the direction of Electricite de France.

Now, following a new French-German agreement, the remainder of the canal will not be continuous, but will consist of four separate sections. Each canal section will be equipped with a powerhouse and locks, and shipping will use the river itself between sections. Four low dams will be built in the river to divert the water into each of canal sections.

The change in plans occurred following German representations that so much water was being diverted into the Grand Alsace Canal that navigation on the German side of the Rhine was frequently impossible and that agriculture was being endangered by a lowering of the water table.

The Grand Alsace Canal is approximately the same size as the Suez Canal, and thus a waterway of major proportions. Its water depth is 31 ft and, with bank slopes of 3:1, it has widths of 450 ft at the water surface and 263 ft at the bottom. About a half-mile above each power station and lock installation the canal divides into two branches, which merge again below. The branch used by shipping is 375 ft wide at the water line and 187 ft at the bottom.

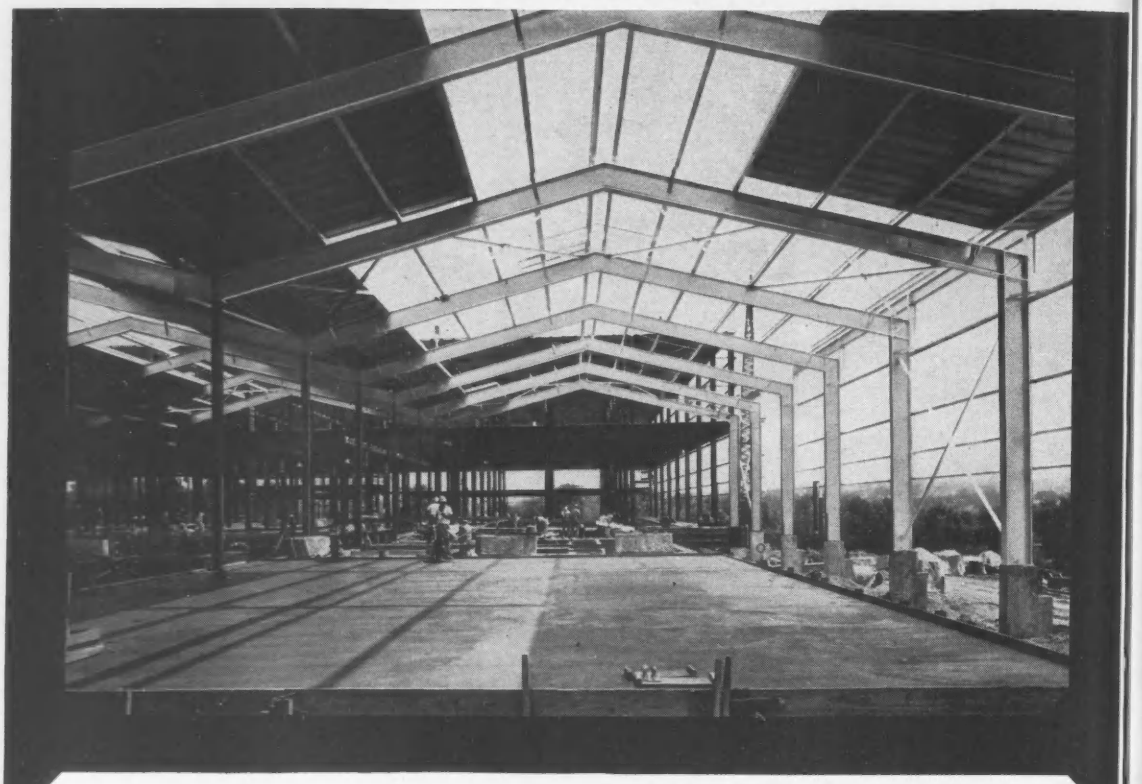


REVISED PLAN for developing Rhine River for power and navigation foregoes a continuous Grand Alsace Canal for a series of short canal reaches.

There are two locks side by side at each location. Those at Kembs, the first installation completed, are 82 ft wide and 330 and 600 ft long. Elsewhere both lock chambers are made 600 ft long, but one is 75 ft wide, while the other has a width of only 40 ft. The smaller lock can be emptied or filled in 11 minutes; for the larger the lockage time is 18 minutes.

The water velocity in the canal is 4 ft per sec compared to as much as 10 ft per sec in the river, which offers a considerable cost saving to shipping. About 5 million tons of products are moved between Basle and Strasbourg each year.

The four power stations so far built are essentially alike in design and roughly of comparable capacities. Kembs, the first completed (1932), contains six 28,000 kw generating units



Compare the clean, simple lines of this structure with the heavier, haunched construction apparent in elastically designed buildings. Savings accrue through faster, easier, prefabricated construction as well as through lighter weight steels.

There's an Inland Structural Steel for every new construction idea

Plastic Design

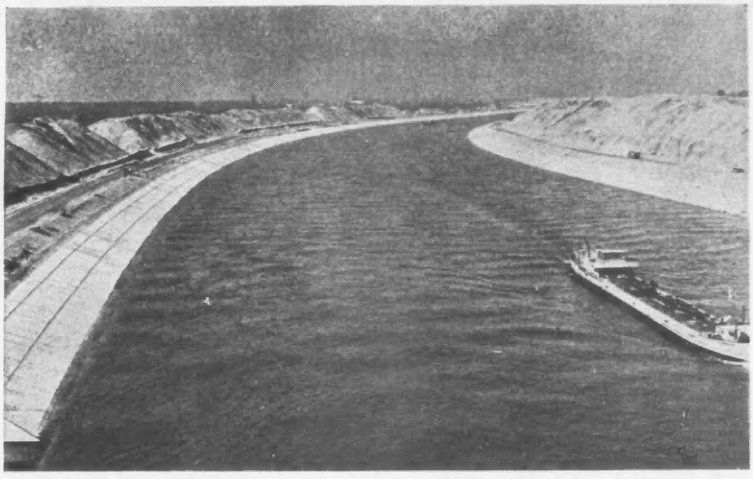
is today more and more coming into widespread use in one and two-story rigid-frame structures. It presents welcome opportunities for reducing labor, time and material costs, for plastic design is based not upon the concept of maximum stress of a member—but upon the *load-carrying capacity of the entire structure.*

In elastic design, the entire member must be designed for the maximum moment. In plastic design, since the moment is distributed to the structure as a whole, no single member need be over-designed and substantial savings—from 5% to 35% in labor and materials—are possible. In addition, since the more indeterminate the structure the greater the saving, design time can actually be reduced by as much as 80%.

If you are contemplating the design or construction of a new building, remember that plastic design is applicable only to a ductile metal such as steel. The considerable savings possible, make it well worth your careful investigation.

Plastic design is accepted by all four National Building Codes as well as many state and municipal codes. For complete information on this modern, cost-cutting construction method, see your local fabricator who now has structural steel available in all shapes and sizes—or call the American Institute of Steel Construction office in your area.

Use Steel *For Modern Construction*



GRAND ALSACE CANAL is as wide and deep as Suez. It permits shipping to avoid high velocity currents in the Rhine.

and operates under a gross head of 54 ft. Ottmarsheim, finished in 1952, and Fessenheim, in 1956, and under approximately the same head as at Kembs, are equipped with four 40,000 kw and four 44,000 kw units respectively. Vogelgrun, just completed, is equipped with four 40,000 kw units which operate under a gross head of 44 ft.

The power plants are equipped with Kaplan turbines. They discharge over gated spillways into a stilling basin fitted with energy-dissipated concrete pyramids so as to keep the canal water as tranquil as possible for navigation.

All of these stations are on the continuous portion of the Grand Alsace Canal. Markolsheim, which is now under construction, will be the first to be built in accordance with the new plan where canal reaches alternate with river reaches. Its principal element of difference will be the diversion dam in the river. This will be a gated structure with five openings 100 ft wide and 36 ft high separated by 23-ft-wide piers.

The canal, which this diversion dam serves, is of practically the same dimensions as the Grand Alsace Canal and about 4½ miles long. For the first 1½ miles it is 450 ft wide, then widens to 835 ft (to provide a waiting harbor for shipping) before it divides into two branches, one leading to the locks, the other to the power plant. Below these facilities, the canal runs for another 1½ miles to empty its waters back into the Rhine.

The Markolsheim power plant will contain four 40,000 kw units, and the locks of the facility will be of the same type and dimensions as those at the completed projects upstream. It is contemplated that Markolsheim will be finished in 1962, and that three similar projects downstream will then be undertaken successively, so that the entire upper Rhine project can be finished by about 1967. At that time it is estimated that the eight power plants will produce some 7 billion kw hr per year to be fed into the French power net.

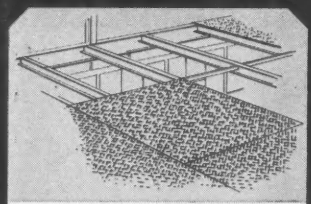
Each of the projects so far completed has been a construction job of major proportions. Ottmarsheim, for example, required 26 million cu yd of excavation, Fessenheim 32 million cu yd and Vogelgrun 17 million cu yd. Because less canal length will be required for Markolsheim and the remaining projects downstream, excavation will be less, but will still average about 15 million cu yd for each project.

Each power station and lock layout requires nearly 1 million cu yd of concrete. In addition all canal banks and bottom above the groundwater table are lined with concrete in the form of precast, vacuum-processed slabs, which adds a considerable concrete yardage to each job.

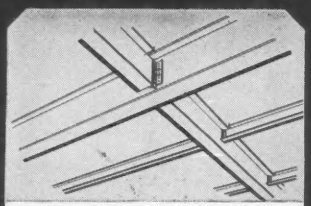
Construction problems encountered on the different projects have been those common to most large earthmoving and excavation operations. Electric shovels of 3 to 5-cu yd size and draglines with 12-cu yd buckets have been used to load 27-cu yd trucks. As much as 1.3 million cu yd of earth has been moved in a single month.

The deep power plant excavations have also posed dewatering problems. At Fessenheim, for example, where the hole was 600 ft long, 300 ft wide and 80 ft deep, bentonite and silicate of soda were injected on the sides and below the bottom to assure watertightness prior to excavation. The injected layers were from 15 to 30 ft thick. About 42,000 tons of injecting material was required, placed by two pumping plants working continuously for seven months.

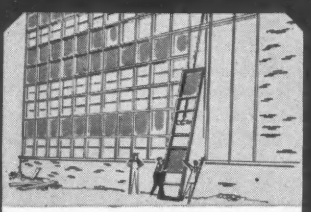
other Inland construction products



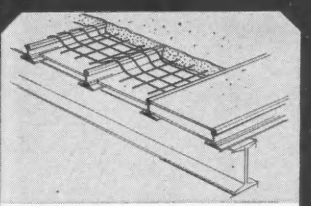
4-WAY SAFETY PLATE has come into general use as an integral, prefabricated part of the supporting structure, providing durable floors and added strength.



WIDE FLANGE BEAMS are the answer wherever more strength with less weight, longer spans with more open floor area, is the goal. Sizes from 8′ to 24′.



INLAND ENAMELING IRON is ideally suited to curtain-wall and enameled panel systems, providing strength, beauty and unlimited design possibilities.



INLAND SUB-PURLINS are especially designed to provide a lighter, more efficient member for shorter-span roofs. They come cut-to-length and mill painted.

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INLAND STEEL CO.
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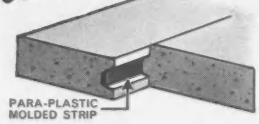
SERVICISED PREMOLDED RUBBERIZED ASPHALT SEALING STRIPS

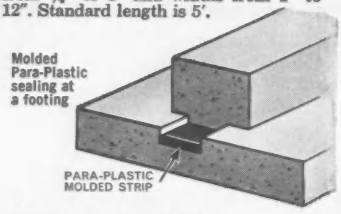
For Sealing Vertical and Horizontal Keyed Construction Joints in Concrete

MOLDED *Para-Plastic*®

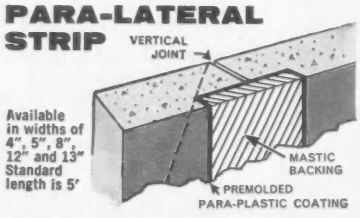


Molded Para-Plastic is a preformed elastic sealing strip composed of rubber, asphalt and other materials, molded in a rectangular shape. Properly installed, Molded Para-Plastic will bond securely to concrete to form a resilient and moisture-tight seal of the joint.

Because it incorporates sealing surfaces on all sides, Molded Para-Plastic effectively seals keyed construction joints and foundation footings. Not recommended for use when the surface is exposed or hydrostatic pressure is present. Available in thicknesses ranging from ¼" to 1" and widths from 1" to 12". Standard length is 5'.



PARA-LATERAL STRIP



Para-Lateral Strip is designed primarily for sealing vertical and sloping joints in new concrete construction, such as retaining walls, abutments, wing walls, foundation walls, tunnels, etc., where backfilling against one side requires a seal to prevent seepage through joints to the exposed side.

Consists of a rigid mastic backing material coated on one side and two edges with a Para-Plastic rubberized-bituminous sealing compound that bonds firmly to concrete after it has set up to form a watertight seal.

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. . . *International*

New filter plant completed as . . .

Asuncion Gets First Water System

It was an event of national significance when Asuncion, Paraguay, completed a municipal water supply and distribution system. The capital's new $11-million system is the first to be built in that South American country.

Before the project was built, all drinking water for the city (pop. 220,000), was obtained from wells, cisterns and street vendors.

Now Paraguay River water is treated and pumped to four distribution reservoirs that supply the population. The system has 250 miles of distribution lines and 10 miles of transmission mains.

Construction of the system had some interesting sidelights. Miles of city streets were substantially improved by the pipeline installation, and Paraguayans saw their first concrete truck-mixers. These were brought in for the job and will remain in the country for other national and civic improvements.

While the reservoir buildup continues behind African dam . . .

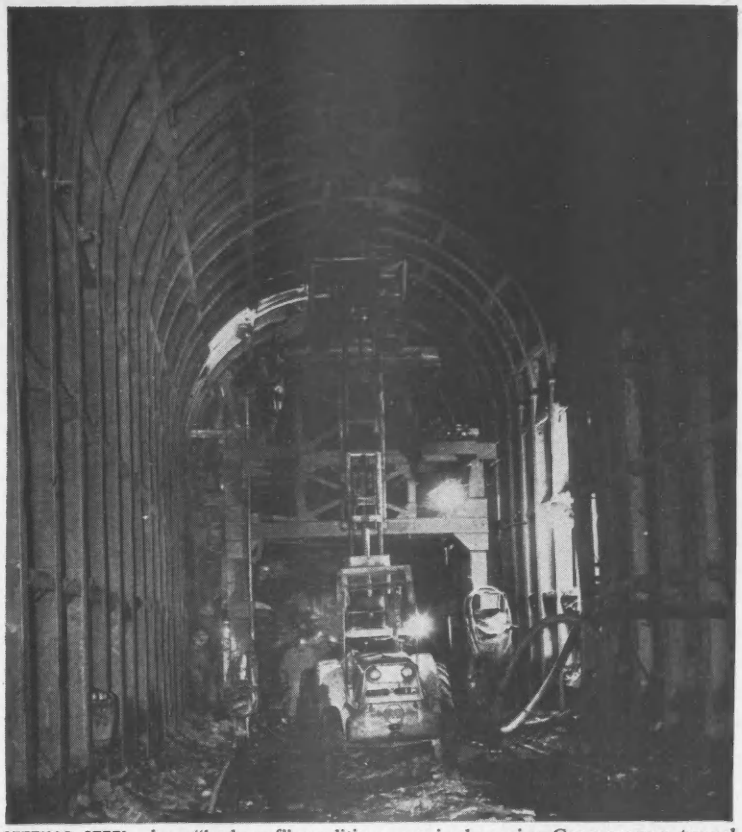
Kariba Delivers First Power

One generating unit at Kariba Dam's underground powerhouse is now on line. The unit is the first of six.

Each generator will produce 100,000 kw at the design power-pool level of the reservoir. However, the first turbine is operating at low head on water supplied through a temporary intake at a lower level. The unit is generating about 68,000 kw.

The Kariba hydro project is an undertaking of the Federation of Rhodesia and Nyasaland. The dam is located on the Zambezi River along the border between Northern and Southern Rhodesia (ENR Nov. 20, 1958, p. 30).

TUNNEL WORKERS swing into position 8" H-beam side post which supports arch rib.



SETTING STEEL where "bad roof" conditions required spacing COMMERCIAL tunnel supports on 4-foot centers.

How to Support a "Bad Roof" Tunnel

The development of an important new source of metallurgical and coking coal was contingent on rail penetration of an almost inaccessible mountain valley.

To reach the 140 million ton bituminous seam in rugged Dickenson County, Virginia, the Norfolk and Western Railway laid a 6.3 mile extension to its Wilder spur. The railway penetrates Sandy Ridge Mountain 800 feet below its 2,730 foot summit with an 8,240 foot tunnel...one of the longest in the East.

Test borings, core-drilled from the top of the mountain to some 17-20 feet below the proposed tunnel floor forewarned of the "bad roof" conditions to be encountered in both headings. Varying thicknesses of unstable gray sandstones, shale, and coal would require tunnel supports designed for quick setting after each mucking operation.

Working closely with COMMERCIAL engineers, Norfolk and Western designers specified 8" steel H-beam tunnel arch ribs, bent to proper contour and set on steel posts for the 20-foot by 27-foot bore.

Here's where COMMERCIAL's 30 year "know-how" paid extra dividends in safety and speed of job completion. Almost as soon as both headings were started, thin laminated sandstone and coal seams appeared following the roof line for almost the entire length of the tunnel. Thanks, however, to COMMERCIAL's accurate fabrication and fast erection design, setting steel progressed rapidly without major mishap to workmen or headings.

A "jumbo" drilling platform was employed to actually handle the steel. One pneumatic hoist mounted on the forward poopdeck swung side posts into place while another hoist on the rear handled the arch rib segments. The sets were then tied together by 1" steel rods and separated by 4" by 4" timbers.

COMMERCIAL delivered posts and arch ribs keyed to the job progress schedule, thus helping 'round-the-clock crews drive the face at an average weekly rate of 250 feet including steel setting...progress that was also important to a new local 450,000 kw powerplant dependent on the valley mines for fuel.

When you design your next vertical shaft or sub-surface tunnel, COMMERCIAL engineers will be glad to offer assistance based on 30 years specialization in ground and rock support systems. There is no obligation, and their recommendations often result in more workable and economical solutions to specific problems.

For complete information, just write to Commercial Shearing & Stamping Co., Dept. E-9, Youngstown 1, Ohio.

COMMERCIAL
shearing & stamping

Here's another reason why Ford Trucks are your best buy!

"OF ALL THE MAKES WE'VE TRIED FORD TRUCKS GIVE US THE LOWEST MAINTENANCE COST!"

ANOTHER REPEAT BUYER OF FORD TRUCKS

Virgil E. Cook, owner of Cook Block and Brick Co., is convincing proof that there is still plenty of opportunity in American business for those sound planning, hard working individuals who want to own their own business. Starting from scratch just 13 years ago, he now owns and operates one of the largest concrete products plants in Eastern Indiana. The workhorses in his fleet of 16 trucks are three Ford Tilt Cab Tandems that are used to haul sand and gravel to the plant and make deliveries in and around Anderson.

Hard-working Ford CT-950 tractor leaves Cook gravel pit with 18 yards of aggregate. Aluminum walking beam and rubber suspension system of tandem axle assembly reduce chassis weight, permit higher legal payloads.

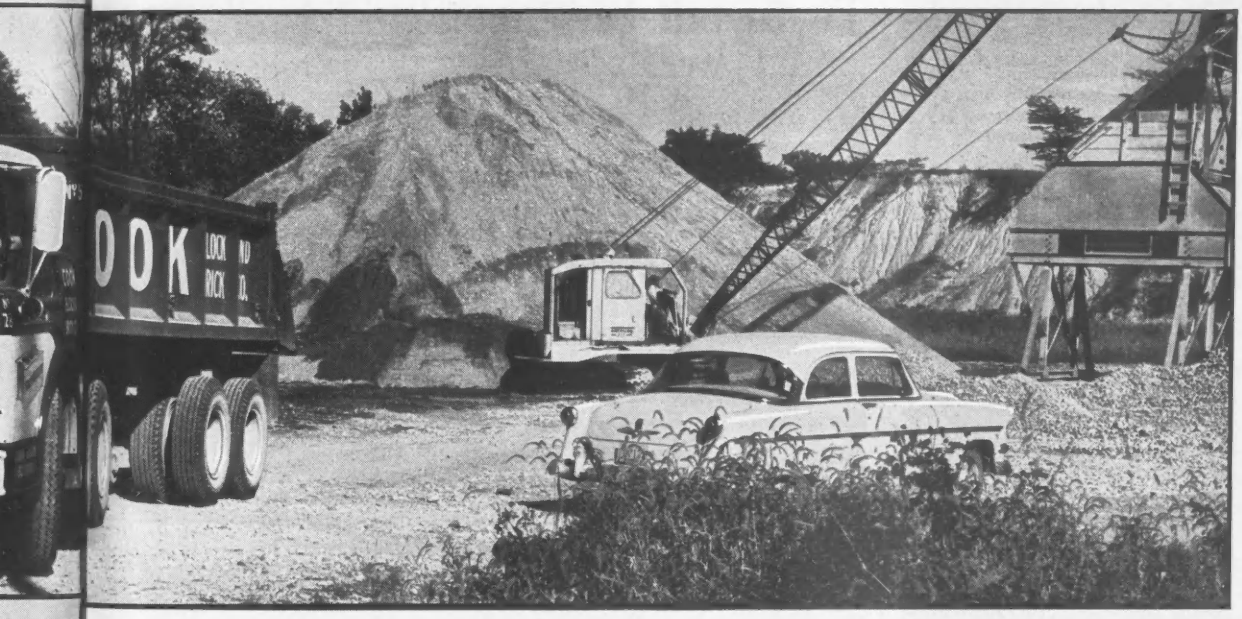
Cook's CT-850 with special flat-bed body and Side-O-Matic unloader delivers blocks right to the job site. Unit carries 600 concrete blocks and spots them where needed.

"Our experience has proved that Ford Trucks can be operated at substantially lower maintenance costs than any other make we've tried. And, equally important in a fleet like ours, we find that our Fords spend much less time in the shop. None of the Ford units purchased since 1958 have been in for major repairs and I am still amazed at the way the older ones keep going.

"The best truck we've ever owned is a 1954 Ford C-700 that consistently carries a load of 350 to 400 blocks over all types of terrain. In spite of this severe work it ran 125,000 miles before we replaced the engine. This unit now has over 140,000 miles on the original ring gear and pinion and it went 60,000 miles before we relined the brakes and put in a new clutch. This is outstanding mileage when you consider that we've realized as little as 12,000 miles from competitive ring gear and pinion sets. Clutch and brake life obtained with other makes in identical service was only 20,000 miles. It's results like this that keep our costs low and convinced us that we should stay with Fords when we bought our bigger trucks in '58.

"Our 1958 and 1959 Ford Tilt Cab Tandems give every indication of equalling or surpassing the fine records set by the C-700. The two CT-950 tractors hauling sand and aggregates to our processing plant breeze through traffic and take the hills like they weren't there at all. Our CT-850 equipped with a flat-bed body has the power and traction to deliver finished products anywhere. With Ford's tilt-cab design we get a real plus as far as payload is concerned because we can carry at least 2,000 pounds more weight on the front axle.

"We buy Ford Tilt Cab Trucks because we think they're the best engineered and most modern gasoline trucks in the heavy-duty field. Here at last is a truck built to permit big legal payloads with enough power to move these loads at economical speeds. We pride ourselves on our modern and efficient equipment and consider our Fords one of the most valuable assets of our business."



'60 Fords are built for longer life . . . with Certified Durability!

Whatever your job . . . wherever you do it . . . you'll discover just as Mr. Cook did, that Ford Trucks are the best investment for your transportation dollar.

Certified results of tests conducted by America's leading independent research organization (name available on request) confirm the fact that Ford Super Duties have been refined for still more durability! Automatic radiator shutters, improved electric fuel pumps and redesigned wiring harnesses are typical of the advancements to be found in these units.

Automatic radiator shutters reduced the coolant temperature variation recorded in severe mountain road tests from a 79° range to a 20° range. Engine operation with coolant temperatures in the 167° to 187° range means less expansion and contraction, more efficient combustion and better lubrication . . . all of which contribute to longer engine life.

Dynamometer tests showed *no vapor lock* with Ford's submerged-type electric fuel pump at temperatures up to 200°. Incipient vapor lock with mechanical fuel pump resulted in a power loss of 9% under the same conditions. Shaker table tests plus constant exposure to oil, water and heat proved 1960 wiring harness to be *three times longer lived.*

FORD TRUCKS COST LESS

LESS TO OWN . . . LESS TO RUN . . . BUILT TO LAST LONGER, TOO!

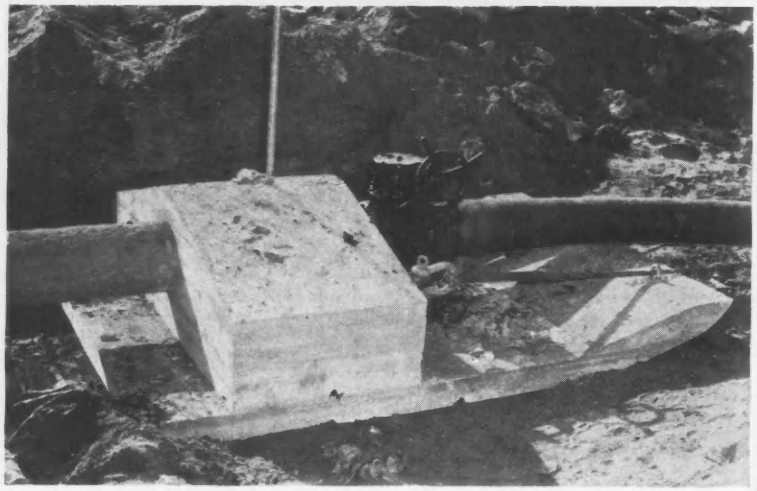
WELDED or RIVETED
STEEL PLATE FABRICATION

- ★ Boiler Casings
- ★ Boiler Breechings
- ★ Flues and Ducts
- ★ Condenser Shells
- ★ Condenser Piping
- ★ Heavy Turbine Housings
- ★ Fan and Blower Housings
- ★ Dust Collector Housings
- ★ Industrial Gas Mains
- ★ Expansion Joints
- ★ Hoppers and Bunkers
- ★ Tanks and Vats
- ★ Pressure Vessels
- ★ Wind Tunnels
- ★ Crane Bridge Girders
- ★ Trolley Frames and Trucks
- ★ Rigid Frames
- ★ Roll-Over Fixtures
- ★ Tank Turrets
- ★ Gun Mounts
- ★ Heavy Truck Bodies
- ★ Engine Frames and Bases
- ★ Crawler Frames
- ★ Press Platens and Beds
- ★ Press Columns
- ★ Heavy Machinery Parts and Assemblies
- ★ Gas Seal Hoods for Blast Furnaces
- ★ Furnace Roof Rings
- ★ Design Conversion of Castings to Weldments

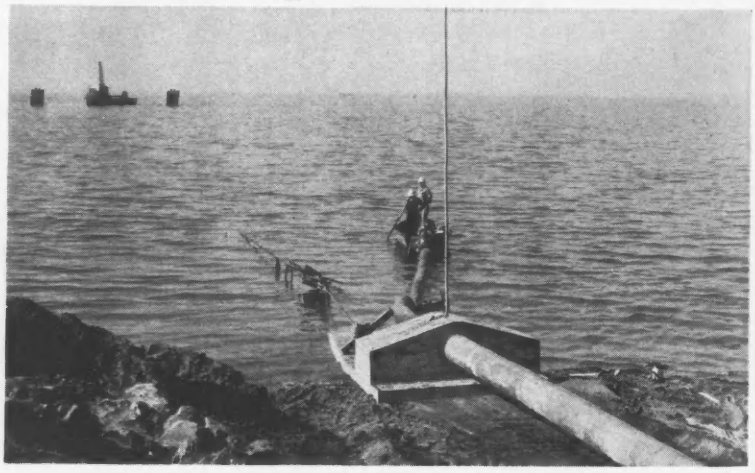
MACHINING
★ Complete Machining Service—Facilities for Heavy Work of Unusual Dimensions

STRUCTURAL STEEL
★ For Buildings, Bridges and Special Purpose Structures
Drum Gates
Roller Gates
Tainter Gates
Tainter Valves
Protection Angles

THE R. C. MAHON COMPANY
DETROIT 34, MICHIGAN
Branch Offices in New York, Chicago, Los Angeles and San Francisco
MAHON



To Install Pipeline, Sled Is . . .



. . . Dragged to Offshore Platform

Engineers of the San Diego Gas & Electric Co. have devised a novel method to transport a 1000-ft concrete-encased steel pipeline from an assembly area on shore to its resting place in San Diego Bay.

The method made use of a concrete sled. Workers embedded the leading end of the pipe—previously covered with a 2¾-in. concrete coating—in the concrete of the sled.

Workers attached a heavy rubber hose to the open end of the pipe and ran a steel cable from the sled to winches aboard a barge anchored in the bay. The open end of the rubber hose was carried across the water in a rowboat as the sled was pulled along the bottom to the unloading platform.

The pipeline will connect the offshore unloading platform with on-shore storage tanks at National City. The storage facilities will be completed in July, along with the first unit of the South Bay power plant.

Barges will deliver the oil to the unloading platform, from which it will be pumped through the marine pipeline to the storage area at 100 psi.

Engineering News-Record welcomes (and pays for) brief descriptions of inventive ideas put to use in design or construction. All such ideas should be submitted—with photographs or drawings to illustrate them if possible—to Editor, Engineering News-Record, 330 W. 42nd St., New York 36, N. Y.

PRESTRESSED CONCRETE IN OUR 50th STATE

Owner, Developer and Contractor: Hawaiian Land Co., Ltd. *Architects & Engineers:* John Graham and Co. *Prestressed Consultants:* Ben C. Gerwick, Inc., San Francisco; Anderson, Birkeland & Anderson, Tacoma; Park & Yee, Honolulu *Prestressed Concrete Fabricator:* Hawaiian Dredging and Construction Co.

...HONOLULU SHOPPING CENTER WILL BE ONE OF NATION'S BIGGEST

All told, this huge complex – named Ala Moana—will cover 50 acres, have parking space for 7,000 cars and will cost some $39,500,000 on completion of phase 2, including the 25-floor office building, 1441 Kapiolani.

The use of prestressed concrete is widespread; in the beams, girders and joists for the parking deck and the 25-floor office building, in street curbing, bumper strips in the parking areas, in lamp posts and in prestressed concrete piles which serve both as foundations and columns supporting the parking deck and mall level shops.

Like all good members of the national "family," the Ala Moana developers turned to the mainland for the ultimate in stress-relieved prestressing strand for the critical members in their project; in this case manufactured by Roebling.

For over a decade, the activities of Roebling in the prestressed concrete field have embraced all phases of this remarkable and economically rewarding construction method. Architects, engineers and builders have found – in many States, both old and new—that the quality of Roebling strand, as well as the quality of Roebling engineering assistance, can't be had—*for the same satisfaction* – from anywhere else in the world.

We are immediately desirous of sharing with you our information, experience and data on prestressed concrete in all of its fascinating areas. Please address inquiries to Roebling's Construction Materials Division, Trenton 2, New Jersey.

ROEBLING

Branch Offices In Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

Men take cover behind equipment during blasting at Barkley Dam Project.

Barkley Dam contractor protects $2,000,000 worth of

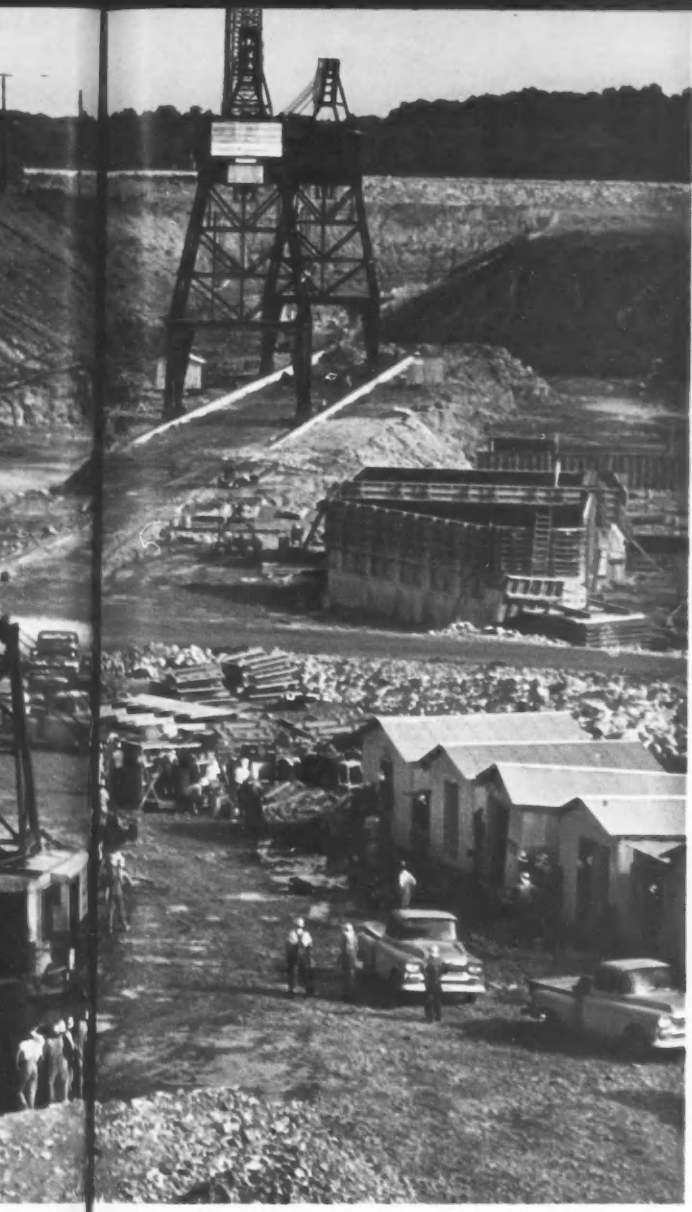
GULF MAKES THINGS

Barkley Dam is a key unit of the vast Barkley Project—the development of the Cumberland River Basin for flood control, navigation improvement, and the production of hydroelectric power.

Tecon Corporation of Dallas, Texas, is building the lock and canal for improvement of navigation between the Cumberland and Tennessee rivers in Kentucky. Their $16,700,000 contract calls for the construction of a lock with a chamber having a clear dimension of 110 by 800 feet, and a normal lift of 52 feet. Some million cubic yards of dirt and rock must be moved and 550,000 yards of concrete poured. Equipment, assembled at the job site, is worth about $2,000,000.

John O'Hearn, Project Manager of Tecon, is in charge of the lock and canal construction. "One of the first moves we made on this project was to set up a simplified routine to protect our equipment through proper lubrication," he says. "A Gulf Engineer made a survey of our equipment, and came up with a program to lubricate virtually everything with three basic Gulf lubricants.

"Our only crankcase lubricant is Gulf Super Duty Motor Oil. Our one general purpose grease is Gulfcrown



Project.

Consolidation of Gulf lubricants in a central supply area helps speed up equipment servicing on major projects like this one.

John O'Hearn (left), Project Manager, Tecon Corporation, Dallas, Texas, discusses equipment performance on the job with S. P. McCracken, Gulf Sales Engineer.

n of equipment with only 3 Gulf lubricants . . .

S RUN BETTER!

Grease E.P. And our basic gear lubricant—for everything from gear boxes on shovels to enclosed gears in concrete mixers—is Gulf Multi-Purpose Gear Lubricant.

"A simplification program like this results in more than just good lubrication," says Mr. O'Hearn. "The engineering help we get from Gulf—plus prompt deliveries—add up to a lot of extra dollars in our pockets."

On your next project, see how Gulf makes things run better! Meanwhile, just call your nearest Gulf office, or write for 88-page "Gulf Contractors' Guide"—the maintenance "bible" for heavy equipment.

GULF

GULF OIL CORPORATION
Dept. DM, Gulf Bldg., Pittsburgh 30, Pa.

Please send latest edition of "Gulf Contractors' Guide."

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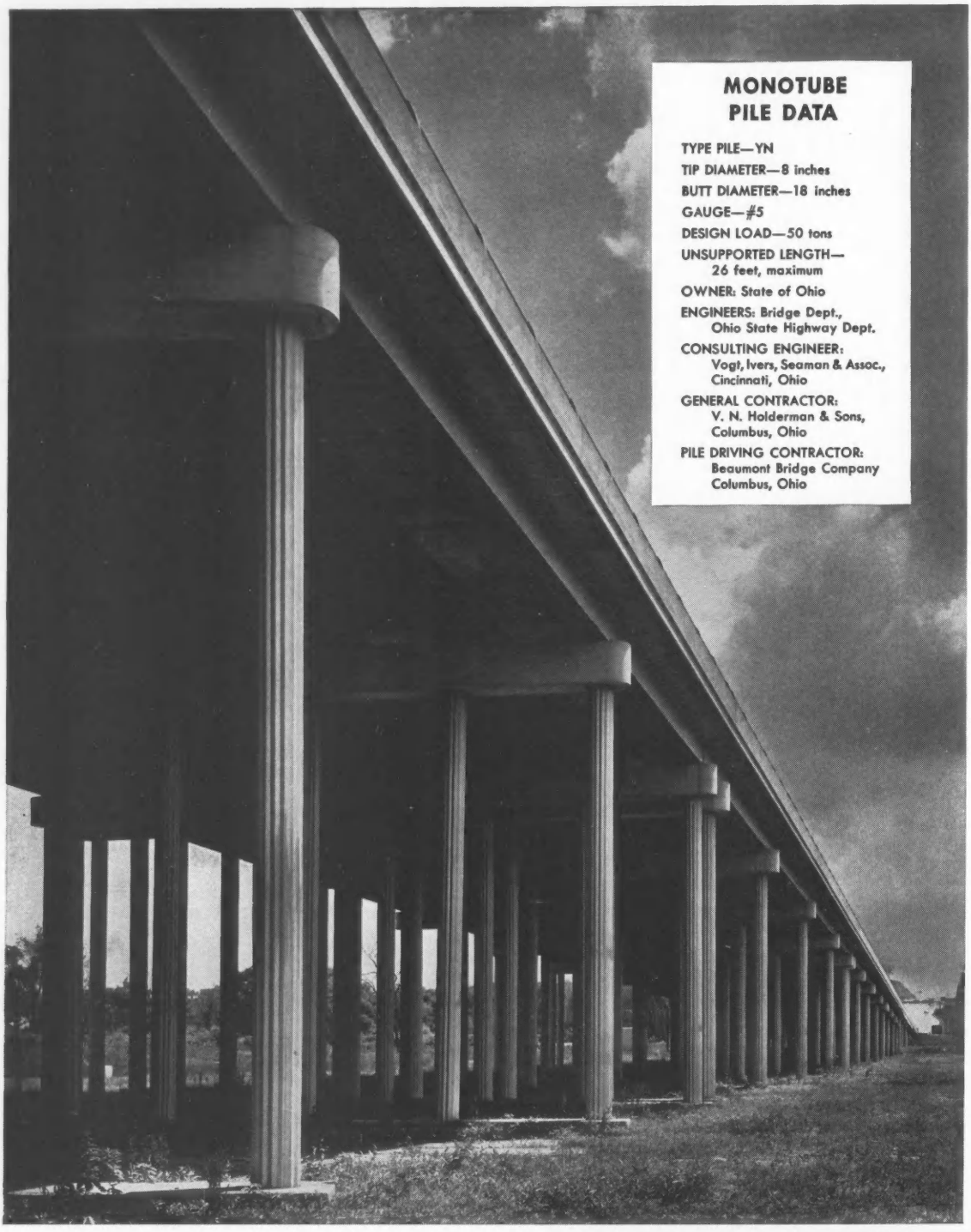


MONOTUBE PILE DATA

TYPE PILE—YN
TIP DIAMETER—8 inches
BUTT DIAMETER—18 inches
GAUGE—#5
DESIGN LOAD—50 tons
UNSUPPORTED LENGTH—
26 feet, maximum
OWNER: State of Ohio
ENGINEERS: Bridge Dept.,
Ohio State Highway Dept.
CONSULTING ENGINEER:
Vogt, Ivers, Seaman & Assoc.,
Cincinnati, Ohio
GENERAL CONTRACTOR:
V. N. Holderman & Sons,
Columbus, Ohio
PILE DRIVING CONTRACTOR:
Beaumont Bridge Company
Columbus, Ohio

VERSATILITY plus DESIGN ECONOMY

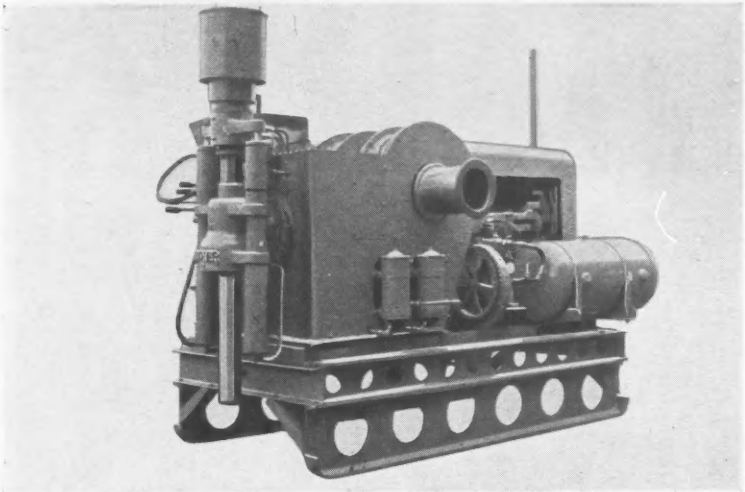
with Monotube piles. When soil conditions in Mansfield, Ohio, prohibited conventional construction in crossing low-lying land, this adaptation of a foundation supported on Monotube steel piles proved to be an economical solution.

Tapered, fluted Monotube piles are available in lengths, diameters and gauges to meet every requirement. The Union Metal Manufacturing Co., Canton 5, Ohio—Brampton, Ontario, Canada.

UNION METAL

Monotube Foundation Piles

New Products



Core Drill Has Air Brakes

This heavy-duty core drill is designed either to core to depths of 4,500 ft or to operate as a rotary drill to 1,500 ft.

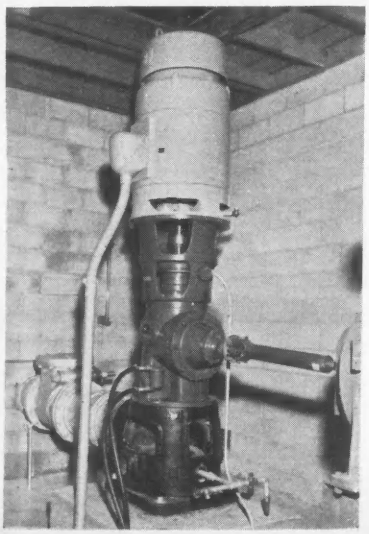
Featuring an hydraulic drill head, the rig is equipped with positive acting, total-contact air brakes and clutch. In the event of air failure an independent system instantly applies full brake pressure until trouble is corrected. The drill head has a standard stroke of two feet and two separate speed ranges. One range is fast for small diameter coring, the second is slow for running drag bits, roller bits, or augering.

Optional equipment includes an automatic hydraulic chuck, which, the maker claims, speeds rod handling and provides full control in an upward or downward direction.

Spindle and chuck of the drill will accommodate 2⅞-in. flush joint drill pipe or the same diameter PK drill rods. Standard models are powered with gasoline or diesel engines, but any source of power can be used, due to the drill's unitized design, according to the manufacturer.

Cathead and wire drum hoists are standard equipment and the rig is available either for truck mounting or skid mounted. Acker Drill Co., Inc., Box 830, Scranton 2, Pa.

Drive Permits Engine Testing



A right-angle gear drive for vertical pumps is now made available in sizes ranging from 15 to 200 hp. The unit is designed to tie in standby diesel or gasoline power to an electrically driven pump.

The auxiliary engine may be tested from idle to operating speed without interfering with normal pumping operations.

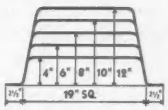
According to the manufacturer, installation is a simple matter since flexible shafting or couplings may be used between the engine and gear drive. Also the new drive eliminates the need for an engine clutch.

Primary applications of the gear drive may be found in waterworks, sewage plants and fire-protection systems where emergency, auxiliary power plants are used. Johnson Gear & Mfg. Co., Ltd., 8th and Parker Sts., Berkeley, Calif.

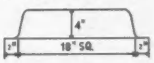
In modern horizontal buildings, too

GRID SYSTEM CONSTRUCTION OFFERS EXTRA ADVANTAGES!

With economical, adaptable GRID SYSTEM construction, many things are possible! GRID SYSTEM two-way ribbed concrete slabs carry maximum loads — allow for the addition of extra floors, penthouse additions, roof parking or storage, etc. Interchangeable steel GRID domes offer wide, open spans and great flexibility in utility layout. GRID SYSTEM ribbed ceilings create an interesting decorative effect, provide good acoustical properties. Air diffusers, lights, acoustic tile or utilities install easily in the recessed areas. Now in use in thousands of buildings from coast to coast*, versatile GRID SYSTEM cuts building time and costs to a minimum.



OVERALL PLAN SIZE — 24" x 24"



OVERALL PLAN SIZE — 22" x 22"

Interchangeable GRID domes are delivered to the job site in quantities large enough for any project. No charge is made for normal wear and tear, including necessary screw holes for sleeves, inserts, etc. All GRID domes have the same slope, for uniform appearance.

*Among the many buildings utilizing GRID SYSTEM construction are: Lexington Junior High School, Lexington, Mass.; Administration Building, Library Building and Classroom Building, Furman University, Greenville, S.C.; Pan American Airways Hangar #14, Idlewild Airport, N.Y.; Off-Street Parking Garage, Post Office Sq., Boston, Mass.; Prudential North Central Home Office Building, Minneapolis, Minn.

GRID SYSTEM T.M.

GRID FLAT SLAB CORPORATION
Boston 25, Massachusetts

GRID SYSTEM Grid Flat Slab Corporation
761 Dudley Street
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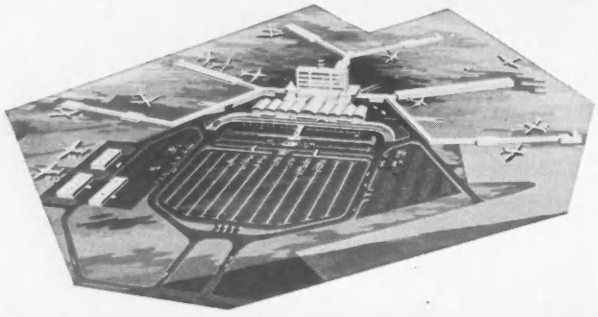
to meet the jet age



Air travelers from the four points of the globe cross paths in Atlanta's new $12 million air terminal. Connors Steel Division produced and fabricated from detailed drawings necessary reinforcing bars for this group of modern buildings. Over 150 detailed placing plans, prepared by Connors Engineering Department, were required to guide bar placement on this intricate job. With years of experience in the fabricated reinforcing bar field, Connors can be depended upon to completely service your job in the manner you deserve. Connors is producing 14S and 18S special large size reinforcing bars, fabricated or cut to length.

Two plants to serve you:

Connors Works
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Birmingham, Alabama

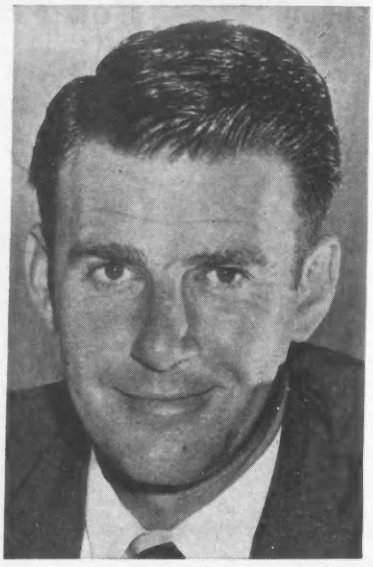
West Virginia Works
P. O. Box 118 - A
Huntington, W. Va.

CONNORS STEEL PORTER DIVISION

H.K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY: with Rubber and Friction Products—THERMOID DIVISION; Electrical Equipment—DELTA-STAR ELECTRIC DIVISION, NATIONAL ELECTRIC DIVISION, PEERLESS ELECTRIC DIVISION; Specialty Alloys—RIVERSIDE-ALLOY METAL DIVISION; Refractories—REFRACTORIES DIVISION; Electric Furnace Steel—CONNORS STEEL DIVISION, VULCAN-KIDD STEEL DIVISION; Fabricated Products—DISSTON DIVISION, FORGE AND FITTINGS DIVISION, LESCHEN WIRE ROPE DIVISION, MOULDINGS DIVISION, H. K. PORTER COMPANY de MEXICO, S.A., and in Canada, Refractories, "Disston" Tools, "Federal" Wire and Cable, "Nepcoduct" systems—H. K. PORTER COMPANY (CANADA) LTD.

Men and Jobs



Western Engineering Firm Promotes Top Personnel

Promotions at Wilsey and Ham, San Francisco engineers and planners, have made Charles T. Blair a vice president and chief engineer. The firm's name has also been changed to include Mr. Blair's name and is now known as Wilsey, Ham and Blair.

Mr. Blair's new duties include supervising projects involving structures and federal government agencies. He also directs the operations of the Los Angeles office.

Also promoted to vice presidents are Gordon Tillson and Jack E. Van Zandt. Mr. Tillson, a hydraulic specialist, served as office engineer for the California cities of Salinas and San Mateo before coming to Wilsey, Ham and Blair in 1953.

Mr. Van Zandt, a transportation authority, joined the company in 1953 after working with the California Division of Highways.

N. Y. Thruway Post Vacant As Clinton Brill Resigns

Clinton B. F. Brill has resigned as chairman of the New York State Thruway Authority. He was appointed to the post, a choice position in the state, by former Governor Averell Harriman in December 1957. The Thruway chairmanship (salary: $19,500) is not a full-time position.

Mr. Brill is returning to the full-time practice of architecture and engineering with DeLeuw, Cather & Brill.

R. Burdell Bixby, secretary-treasurer of the authority, is serving as acting chairman of the three-member agency.

the best off-the-road equipment . . .

is off-the-ground equipment

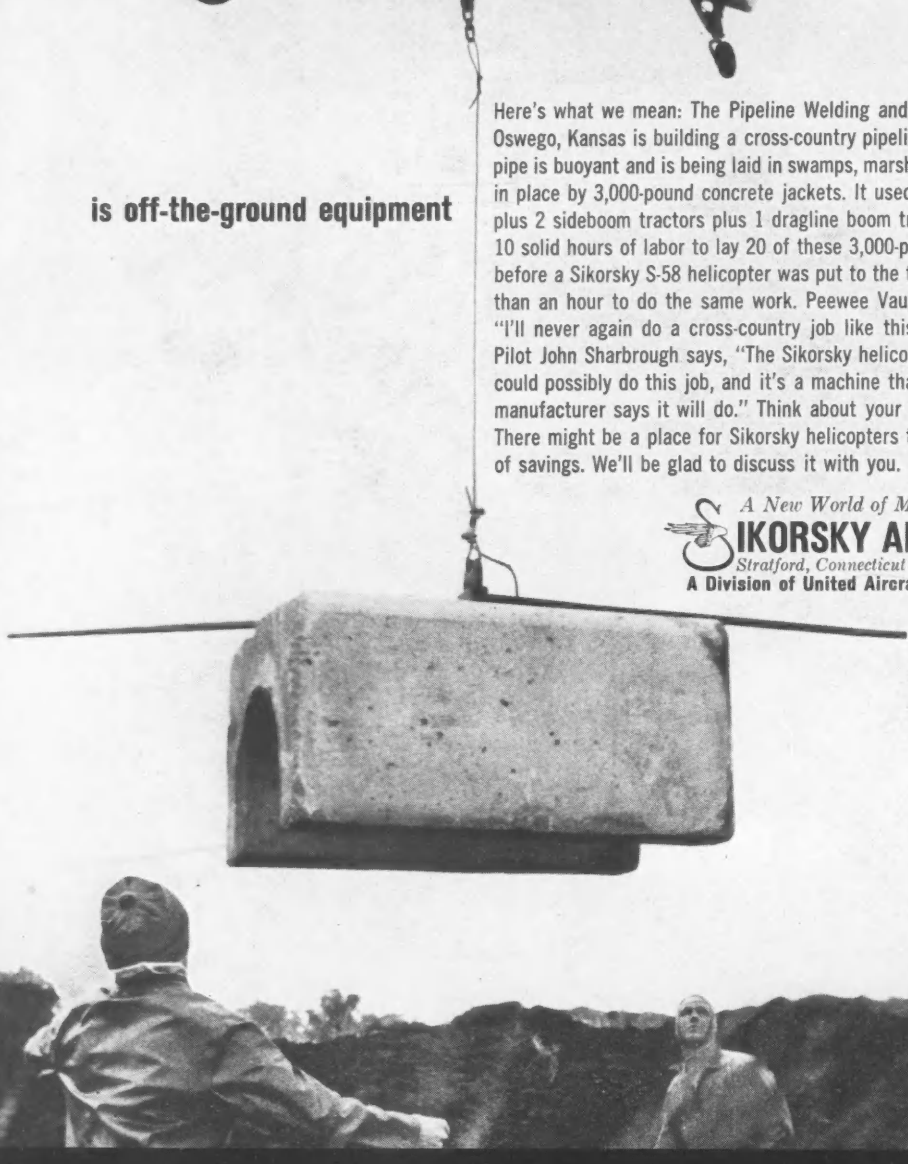
Here's what we mean: The Pipeline Welding and Construction Company of Oswego, Kansas is building a cross-country pipeline in rural Minnesota. Since the pipe is buoyant and is being laid in swamps, marshes and lakes, it has to be anchored in place by 3,000-pound concrete jackets. It used to take 20 men with tools plus 2 sideboom tractors plus 1 dragline boom tractor plus flotation gear plus 10 solid hours of labor to lay 20 of these 3,000-pound concrete jackets. That was before a Sikorsky S-58 helicopter was put to the task. Now it takes just 4 men less than an hour to do the same work. Peewee Vaughn, project foreman, says, "I'll never again do a cross-country job like this without a helicopter." Pilot John Sharbrough says, "The Sikorsky helicopter is the only helicopter that could possibly do this job, and it's a machine that will do everything the manufacturer says it will do." Think about your own business for a moment. There might be a place for Sikorsky helicopters to open up a whole new area of savings. We'll be glad to discuss it with you.

A New World of Mobility by

SIKORSKY AIRCRAFT

Stratford, Connecticut

A Division of United Aircraft Corporation



Obituaries

Bassett Jones, 82, pioneer in the design of high-rise, high-speed elevators, including those in the Empire State Building in New York, and in the development of modern artificial lighting practices. He retired from the consulting firm of Meyer, Strong & Jones, New York, in 1933, thereafter practicing now and then as an individual consultant. His most notable work was the design of the illumination for the New York World's Fair in the late Thirties.

George A. Boehm, 85, retired New York City architect and designer of many public buildings in the area. He practiced in the city for fifty years after graduating from Columbia University in 1897. He also studied in Paris and Rome. Mr. Boehm prepared the building code for Mount Vernon, N. Y., and was a member of the advisory committee on the building code of New York City.

Henry D. Paschen, 77, board chairman of Paschen Contractors, Inc., Chicago, and constructor of many Chicago skyscrapers. He co-founded the firm in 1905.

Grover Cleveland Denny, 67, construction engineer for Merritt-Chapman & Scott Corp., New York City. Mr. Denny, with the company for 25 years, was project manager on the Baltimore Harbor Tunnel and also headed the company's operations on the foundations for the Mackinac Bridge.

Rudolph F. Munz, 70, former city engineer of Garfield Heights, Ohio.

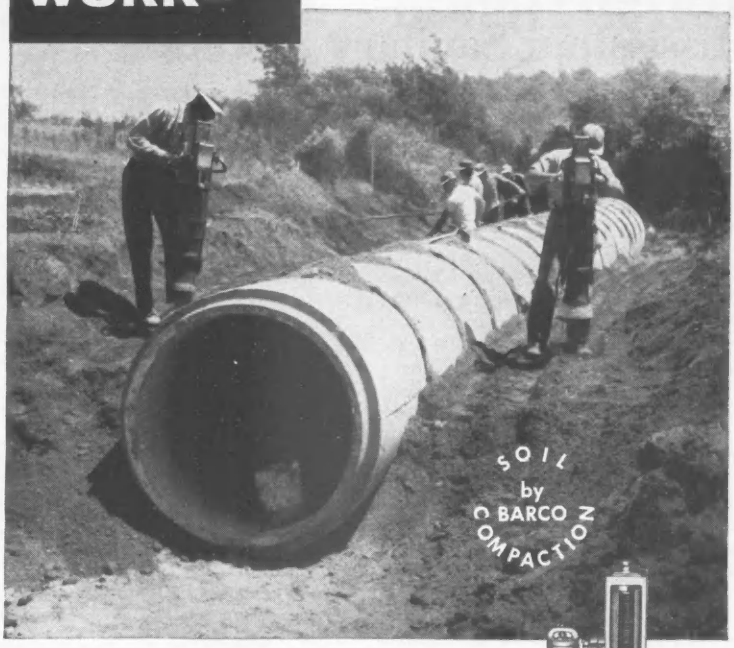
Albert E. Hotard, 34, assistant bridge engineer for the Louisville & Nashville railroad.

Russell B. Moore, 64, founder and senior partner of Moore & Heger, Indianapolis consulting engineers. Mr. Moore, designer of many sewage treatment plants throughout the state, served as a consultant to the Indianapolis Sanitation Board.

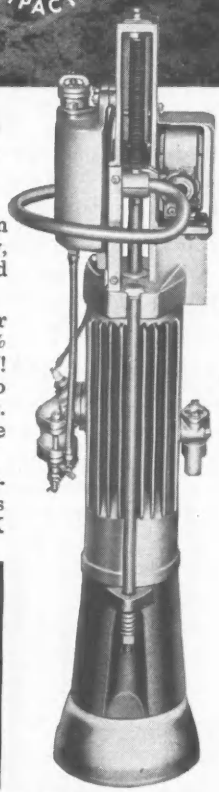
Abraham Streiff, 79, retired consulting civil engineer, Jackson, Mich. Mr. Streiff, who was known for his design and construction of many hydroelectric plants in the U. S. and abroad, was associated with the Fargo Engineering Co. for 25 years. He also served Consumers Power Co., was vice president of the Ambursen Engineering Corp. For several years he was hydraulic design consultant for the American Smelting and Refining Co. on mining operations at Black Lake in Quebec.

ON ROAD WORK–

Tamping fill around 4 ft. concrete pipe culvert on New York State Thruway Extension near West Seneca, N.Y. The Barco Rammers are owned by S. J. Groves & Sons Co., Syracuse, N.Y.
(Photo: CONSTRUCTIONEER)



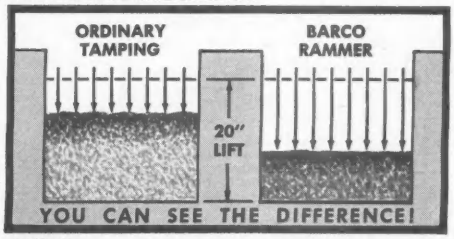
Barco Rammers are Essential



CHECK THE RECORDS for *soil compaction* on every top ranking highway, toll road, thruway, or freeway built in recent years and you will find Barco Rammers!

Easily meet rigid specifications—In test after test, Barco Rammers have delivered 95% to 97.5% compaction (modified Proctor Method)—EASILY! EFFICIENTLY! ECONOMICALLY! The Barco Rammer is especially useful in restricted areas. ONLY Barco can produce specified high degree compaction on lifts up to 20 inches.

Get jobs finished on time—One of the biggest advantages offered by Barco Rammers is ability to handle work in minimum time. ASK FOR A DEMONSTRATION.



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PRODUCTS BACKED BY EXPERIENCE

BARCO MANUFACTURING CO.
514C Hough Street • Barrington, Illinois

Sold and Serviced by Nation's Leading Distributors

Bids taken two ways on pipe for . . .

Mississippi Sanitary Sewers

Concrete pipe outpointed vitrified clay in the bidding for 68,072 lin ft of 6 to 12 in. pipe for the gravity sewers, on this job to provide complete collection and outfall sewers, and treatment facilities, for Tylertown, Miss. J. E. Carruth, McComb, Miss., is the engineer.

The city's award at $268,670, to Taylor-Wheless Co., Inc., Jackson, Miss., on the less costly concrete pipe alternate, was subject to Public Health Service approval. It was 4.7% below the engineers estimate, made before detailed plans were completed for the job.

Sewerage will be treated by a single cell 13½-acre waste stabilization pond.

Work includes gravity and pressure sewers, an 8-in. force main, manholes, a sewage pumping station, 6-in. service lines, and other related work and appurtenances.

Concrete in manholes and walks must attain a compressive strength of 2,500 psi, other concrete 3,000 psi, at 28 days.

Cast iron pipe in gravity and pressure sewers is Class 100.

The contractor must furnish all materials. Rail and truck transportation are available. The railroad is at the site.

The bidding included:

Concrete Sewer Pipe Alt.

1C	Taylor-Wheless, Jackson, Miss.	$268,670
2	Delta Constr. Co. of Jackson	279,597
8	A. A. Busch, Contr., Laurel, Miss.	311,320
EE	J. E. Carruth, McComb, Miss.	281,800*

Vitrified Clay Sewer Pipe Alt.

1	Taylor-Wheless, Jackson, Miss.	$276,345
2	Delta Constr. Co. of Jackson	285,971
8	A. A. Bush Contr., Laurel, Miss.	320,252
EE	J. E. Carruth, McComb, Miss.	281,800*

* Preliminary

Bids: 10-6-59 Items	Unit	Quantity	Unit Prices 1C	2
Alt. A. Concrete Pipe Sewers				
CSP, 6", cut, 0-6'	lf	22,207	$1.34	$1.55
6-8'	lf	5,220	1.75	1.77
8-10'	lf	156	2.17	2.07
10-12'	lf	144	2.66	2.80
12-14'	lf	169	3.08	4.15
14-16'	lf	191	4.00	5.75
16-18'	lf	68	6.00	7.30
8", cut, 0-6'	lf	18,125	1.65	1.77
6-8'	lf	5,181	2.09	2.02
8-10'	lf	2,210	2.56	2.40
10-12'	lf	403	3.08	3.20
12-14'	lf	90	5.00	4.65
14-16'	lf	70	8.00	6.20
10", cut, 0-6'	lf	6,059	1.96	2.22
6-8'	lf	3,555	2.20	2.43
8-10'	lf	994	2.97	2.80
10-12'	lf	751	3.61	3.70
12-14'	lf	498	5.20	5.00
14-16'	lf	32	9.00	6.70
12", cut, 0-6'	lf	150	2.31	2.80
6-8'	lf	100	2.87	3.10
8-10'	lf	1,466	3.41	3.45
10-12'	lf	133	4.07	4.30
12-14'	lf	100	5.50	5.65
Wye, 6 x 6" & 1/8 bend	ea	226	3.60	5.20
8 x 6" & 1/8 bend	ea	152	7.10	8.55
10 x 6" & 1/8 bend	ea	24	13.85	12.55
Service line, all depths, 6"	lf	9,800	1.40	1.62

Bids: 10-6-59 Items	Unit	Quantity	Unit Prices 1C	2
Alt. B. Vitrified Clay Pipe Sewers				
VCSP, 6", cut, 0-6'	lf	22,207	$1.43	$1.63
6-8'	lf	5,220	1.84	1.85
8-10'	lf	156	2.26	2.15
10-12'	lf	144	2.67	2.81
12-14'	lf	169	3.09	4.16
14-16'	lf	191	4.01	5.76
16-18'	lf	68	6.01	7.31
8", cut, 0-6'	lf	18,125	1.75	1.86
6-8'	lf	5,181	2.19	2.12
8-10'	lf	2,210	2.66	2.50
10-12'	lf	403	3.11	3.22
12-14'	lf	90	5.03	4.67
14-16'	lf	70	8.03	6.22
10", cut, 0-6'	lf	6,059	2.10	2.35
6-8'	lf	3,555	2.34	2.56
8-10'	lf	994	3.11	2.93
10-12'	lf	751	3.79	3.70
12-14'	lf	498	5.38	5.00
14-16'	lf	32	9.18	6.70
12", cut, 0-6'	lf	150	2.48	2.95
6-8'	lf	100	3.04	3.25
8-10'	lf	1,466	3.66	3.60
10-12'	lf	133	4.32	4.35
12-14'	lf	100	5.75	5.70
Wye, 6 x 6", & 1/8 bend	ea	226	3.50	5.00
8 x 6", & 1/8 bend	ea	152	5.20	7.20
10 x 6", & 1/8 bend	ea	24	8.20	8.05
Service line, all depths	lf	9,800	1.49	1.67
Items Common to Both Alternates				
Manhole, depth 0-6'	ea	116	140.00	160.00
6-8'	ea	40	184.00	185.00
8-10'	ea	14	210.00	215.00
10-12'	ea	4	296.00	260.00
12-14'	ea	2	366.00	330.00
14-16'	ea	1	423.00	410.00
16-18'	ea	1	500.00	515.00
Drop manhole, depth 0-6'	ea	2	175.00	200.00
6-8'	ea	11	260.00	230.00
8-10'	ea	6	330.00	280.00
10-12'	ea	3	406.00	320.00
12-14'	ea	1	496.00	400.00
Cleanouts, 0-6'	ea	50	50.00	25.00
6-8'	ea	8	75.00	30.00
Conc cradle & encasement	cy	60	25.00	35.00
Wash gravel fndn matl	cy	75	7.00	6.00
Timber shoring left in pl	Mfbm	27	100.00	80.00
Asph paving, remov & repl	sy	858	3.00	1.75
Conc drwy, 6", remov & repl	sy	68	5.00	8.00
base for asphalt paving, 6" under streets	sy	210	7.00	8.00
8" under hwy crossing	sy	40	9.00	10.00
4" sidewalk, remov & repl	sy	25	4.00	6.00
curb & gutter, remov & repl	lf	40	3.00	3.00
Grav base for asph surf (LVM)	cy	165	2.50	2.50
Clay gravel surfacing (LVM)	cy	445	2.50	2.00
Fence, remove & reset	lf	100	0.30	0.50
CIP gravity sewer, 6"	lf	36	3.50	3.50
8"	lf	1,194	4.50	4.80
10"	lf	677	5.50	6.00
12"	lf	18	7.00	8.00
Concrete piers	cy	78	80.00	100.00
CIP grav sew bored & jacked				
under hwys, 6"	lf	166	11.00	12.00
8"	lf	241	13.00	15.00
10"	lf	171	15.00	18.00
under RR, 8"	lf	84	17.00	15.00
10"	lf	109	20.00	18.00
CMP encasement installed, 12"	lf	80	15.00	12.00
15"	lf	80	19.00	16.00
18"	lf	80	25.00	20.00
Open trench hwy crossing	lf	76	3.00	12.00
RR crossing	lf	96	3.00	13.50
Lagoon & Lift Station				
Clean & grub	ac	23	160.00	150.00
Excavation & embankment	cy	45,485	0.40	0.33
Incidental concrete	cy	10	80.00	135.00
Cast iron M.J. force main, 8"	lf	576	4.50	4.35
drain line, 8"	lf	72	4.50	4.35
Blowoff valve, 6"	ea	1	90.00	75.00
Shear gate valve, 8"	ea	2	120.00	85.00
Fencing	lf	4,100	0.30	0.36
Seed & fertilizer	ac	4	200.00	275.00
Lift station	ls	job	17,000	16,033
Creo lumb, 16# pressure treat	Mfbm	0.435	300.00	300.00
M.J. cast iron pipe fittings	t	0.300	600.00	600.00

Commence: Dec. 1959. Completion schedule: 300 cal days. Liquidated damages: $50/day.

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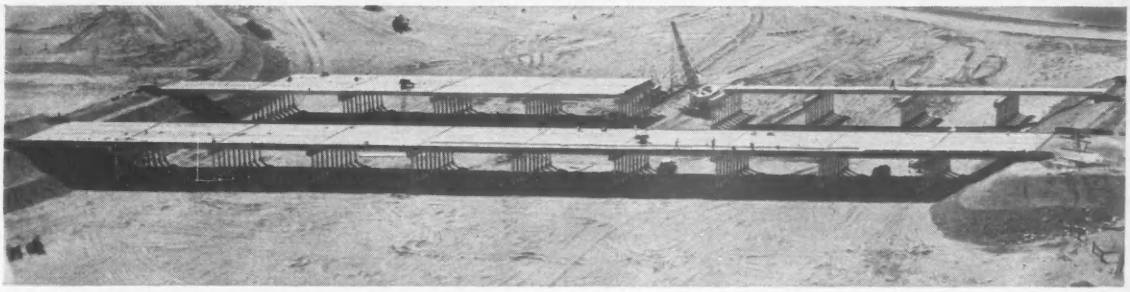
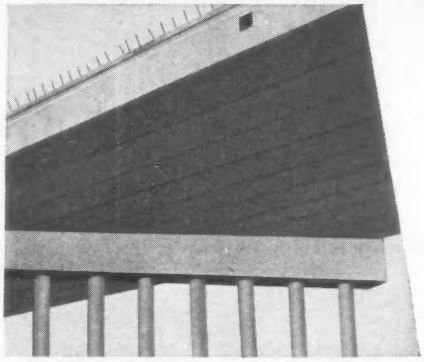
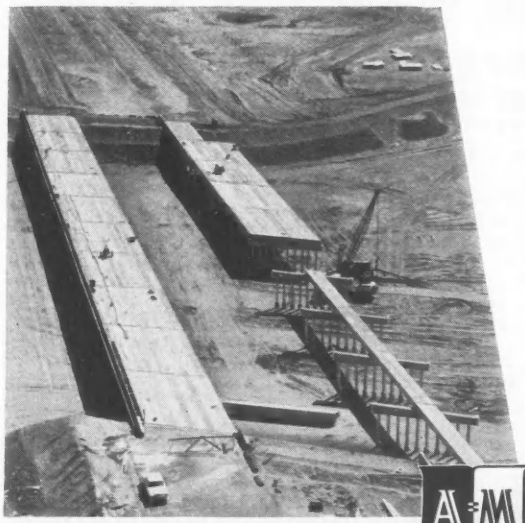


Dual lane highway bridges, constructed with prestressed pretensioned Amdek Beams, near completion in Socorro County, New Mexico. Erected for the New Mexico State Highway Department as part of the Federal Interstate Program.



Low depth-to-span ratio means less weight, greater clearance and reduced fill. Smooth underdeck offers minimum resistance to flood debris.



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Materials Prices

Monthly Market Quotations by ENR Field Reporters

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 In.	4x12x12 In.	8x12x12 In.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 In.	10x12x12 In.	12x12x12 In.	BRICK— Per M. in quantity Common backing	Straight hard	LIME— Per ton, in paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized
Atlanta	$186.10*pe*	$154.95*pkke*	$309.90*pe*	$348.65*pe*	.....	.....	$33.20*uu*	$36.70*uu*	$36.50*hh*	$28.50*hh*	$28.50*hh*
Baltimore	217.00	231.00	434.00	491.00	602.00	690.00	36.00	41.00	35.80	23.40	.....
Birmingham	135.00*pss*	152.00*pss*	.....	303.00*p*	376.00*p*	465.00*p*	27.00*ff*	38.00*jj*	38.28*mm*	20.87*mm*	26.33*gmm*
Boston	232.00†*mm*	248.00†*mm*	463.25†*mm*	556.00†*mm*	.....	.....	43.50*p*	58.00*p*	42.00§	34.00§	.....
Chicago	137.00*ll*	149.00*ll*	280.00*ll*	.....	.....	.....	32.00	34.00	38.00*ll*	35.20*o ll*	.....
Cincinnati	160.00*mmvv*	172.00†*mmvv*	327.00†*ddmm*	390.00†*mmvv*	425.00†*mmvv*	500.00†*mmvv*	48.00†*k*	47.00†*k*	29.10†*mm*	25.10†*mm*	29.10†*mm*
Cleveland	205.00*tt*	219.00*tt*	.....	465.00*tt*	.....	709.00*tt*	41.75*tt*	45.75*ggtt*	32.75*ptt*	28.00*ptt*	.....
Dallas	155.00	155.00	306.00	370.50	452.25	560.00	30.00	50.00	41.80	24.58	28.50
Denver	170.00	185.00	310.00	310.00	390.00	442.00	35.00*zz*	54.00	48.00*p*	42.00*p*	46.00*p*
Detroit	257.00*mmR*	274.00*mmR*	514.00*mmR*	582.00*mmR*	767.00*mmR*	876.00*mmR*	53.50*mmR*	54.00*pmmR*	38.00*mm*	30.00*mm*	40.00*mm*
Kansas City	158.00	158.00	312.00	312.00	400.00	500.00	34.00	34.00	36.26	34.26	29.76
Los Angeles	"	"	"	"	"	"	38.00*uu*	.....	38.00*nnll*	38.00*nnll*	39.00*nnll*
Minneapolis	208.00*pe*	225.00*pe*	452.00*pe*	225.00*pee*	.....	.....	49.00*epe*	57.50*ype*	49.00*bbe*	38.00*bbe*	52.00*bbde*
Montreal	168.78*auqoo*	180.93*auqoo*	325.00*auqoo*	220.00*qoo*	400.00*qoo*	.....	48.25*bl*	56.30*b*	39.00	22.00	13.25
New Orleans	198.00	198.00	370.00	370.00	.....	.....	42.00	55.00	44.00	32.00	32.00
New York	185.00*h*	197.00*h*	294.00*ch*	297.00*hn*	.....	.....	46.00*p*	.....	40.00*p*	38.00*p*	.....
Philadelph'a	202.10*ss*	215.60*ss*	404.20*ssxx*	485.10*ss*	.....	.....	42.00*mm*	50.00*mm*	40.00*mmp*	21.50	21.50
Pittsburgh	200.00*t*	213.00*t*	400.00*t*	453.00*t*	607.00*t*	693.00*t*	39.00*t*	46.00*t*	38.00*t*	33.00*t*	34.00*t*
St. Louis	180.00*mmpp*	190.00*pp*	385.00*pp*	401.00*ppp*	459.00*pp*	621.50*pp*	44.00*mmpp*	45.50*pp*	1.00*aapp*	.80*aapp*	1.35*aapp*
San Francisco	156.85*mm*	177.10*mm*	235.30*ddmm*	159.40*qmm*	.....	.....	43.00*mm*	43.00*mm*	29.24*mm*	29.24*mm*	31.74*mm*
Seattle	235.00*pt*	270.00*pt*	490.00*pt*	265.00*pwt*	.....	.....	52.00*t*	66.00*t*	52.00*bbt*	28.00*bbt*	4.50*mbbt*
Toronto	158.00*rr*	173.00*rr*	336.00*rr*	263.00*frr*	378.00*rr*	.....	27.00*rr*	36.00*rr*	40.00*mm*	36.50*mm*	34.50*mm*

*§ F.o.b. yard. *" F.o.b. plant Stockton. *† F.o.b. yard Roxbury. *% Smooth. *b $4.50 del. *c 8 x 12 x 12 in.-6 cell. *d Pulverized hot. *e less 5% disc., 10th., *f 8 x 8 x 12. *g Lumps, $26.72. *h F.o.b. trucks, job site N.Y.C. *i 60 lb sacks., *j Truck load or over. *k $1.00 discount per M, 10 days. *l Red face. *m Per bb. 180 lb. processed. *n 7¾ x 7¾ x 12. *o Mason's double hydrated pressure. *p Truck lots. *q Provincial and Municipal tax extra (6%). *r Not used: earthquake danger. *s 8 x 16 x 12. *t less 2% disc., cash. *u Incl. Federal tax. *v Sand lime. *w 5 x 8 x 12. *x dumped. *y Chi common. *z Pebble; 80 lb sack. *aa 50 lb sack. *bb LCL. *dd 6 x 12 x 12. *ff 80% common. *gg Smooth. *hh less 25¢ disc., cash. *ii F.o.b. plant. *jj rough; smooth: $40. *kk 3½ x 11½ x 11½. *ll less 2% disc. 10th. *mm less 2%, 10 days. *nn F.o.b., L. A. *oo less 2%, 30 days. *pp add 2% sales tax. *qq 8 x 5½ x 11½. *rr 2½% disc., 10 days. *ss 5% disc., 10 days. *tt less 2% disc., 15th. *uu less 50¢/M, 10 days *vv 4000 pcs. and over. *xx New specification, details to come *xx Revised eff. Jan. '60. *R Revised eff. Dec. '59.

PAINT, ROOFING—F. O. B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600 lb. (Approx.) bbl. F.O.B. Plant Dry a C	WHITE LEAD Per 100 lb. in 100 lb. cases in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum c	Ferric Oxide d	ROOFING SUPPLIES; Carload lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 360 lb. bbl. per ton
Atlanta	$13.75*ggJO*	$24.00*ggJ*	$3.59	$3.86	$3.31	$2.90*kk*	$2.25*kk*	$2.85†*kk*	$0.67*kk*	$65.35*kk*
Baltimore	17.50*pp*	24.00	3.00	4.40	3.50	3.06	3.67	4.04	.50	54.00
Birmingham	20.00†*J*	29.00†*J*	3.90*J*	3.40*J*	....	3.08†*mm*	3.28*iitmm X*	2.28*iimm*	.75*ffmm*	45.00*eemm*
Boston	24.95†*oomm*	26.90†*mmm*	....	....	....	3.74*q*	2.48*q*	2.83*q*	.50*g*	58.00*g*
Chicago	15.25*rJqqpp*	24.00†*J*	....	....	....	3.80*ukk*	2.76*okk*	3.00*okk*	48.00*bbukk*	57.70†*kk*
Cincinnati	15.25†*JO*	24.00†*J*	....			2.87*mm*	2.02*mm*	2.42*mm*	.428*ymm*	55.96*Hmm*
Cleveland	25.65†	26.90†	2.580*ggP*	2.82*ggp*	3.50*qqq*	2.82*q*	2.05*o*	2.42*o*	.484*y*	49.00*qq*
Dallas	22.50	23.50*M*	....	3.25*B*	....	3.00*u*	3.00*o*	3.00*o*	.470	66.00*hh*
Denver	23.00*n*	24.00	3.98	5.20	3.70	2.86	2.12*o*	2.80*o*	.50*ff*	50.00
Detroit	15.75*r*	24.00*rr*	2.70*mm*	3.95*mm*	2.70*mm*	2.82*mm*	2.05*mmll*	2.42*mmll*	.56*ffmm*	49.00*mm*
Kansas City	26.90*lggoo*	25.65	3.99	3.43	3.01	4.01*mm*	2.77*mm*	2.77*mm*	82*y*	.....
Los Angeles	16.25*yy*	22.00	3.30*n*	4.50*n*	4.20*n*	3.40*nkk*	2.40*niikk*	*l*	75*nykk*	*l*
Minneapolis	16.75*N*	21.50*kk*	....	....	....	2.87*kk*	2.12*iikk*	2.42*iikk*	438*ikk*	50.00*rkk*
Montreal	19.45*O*	26.00*wtt*	5.52*Dfft*	6.55*zff*	5.10*kfft*	5.40	4.65*f*	4.65†	1.60	4.40*uu*
New Orleans	23.00*Jpp*	24.00*J*	....	....	....	2.78	1.98	2.85	.680	45.50
New York	15.25*ooO*	29.75	....	....	....	3.06*zz*	2.02*zzo*	2.45*o*	.438*s*	49.00*
Philadelphia	16.25*Omm*	24.75*mm*	3.35*mm*	3.90*mm*	2.65*Rmm*	4.70	3.60	2.85	.515	50.00
Pittsburgh	21.00*mggJ*	24.00*J*	2.20*fEJ*	2.25*fFJ*	2.20*fGJ*	3.57*nH*	2.75*nH*	2.95*H*	.48*H*	55.00*H*
St. Louis	25.65†*m*	26.90	....	....	....	3.20*iimm*	2.31*kk K*	2.86*kk K*	425*y K*	62.00 *K*
San Francisco	26.70*mm*	26.90*mm*	3.20*mm*	4.30*mm*	3.50*mm*	2.87*mm*	1.72*aaiimm*	2.59*mm*	46*ff*	54.00
Seattle	13.35*HO*	24.00*H*	....	4.19*ceffJ*	....	3.75*qccH*	3.32*hccH*	.....	55*cc*	.....
Toronto	14.45	20.65	5.15*J*	6.18*J*	5.95*J*	3.00	2.40*aae*	2.40†	1.01*f*	50.00*A*

*† Delivered. * Note: Red lead in oil 50% higher than white lead in oil. *" Aver. wt. approx. 425 to 550 lb drums. *a Red lead prices change frequently due to pig lead price changes. *b U.S. War Dept. Spec. 3-49A. *c ASTM Spec. D266-31. *d 80% minimum ferric oxide. *e Per 108 sf roll. *f Per 432 sq ft. *g F.o.b. yard Roxbury. *h Per roll, 65 lb. *i Net carload prices, Minneapolis and vicinity. *j 45 gal containers. *k Over 80% ferric oxide. *l Not used. *m 100 lb. keg. *n F.o.b. city. *o Per 60 lb roll. *p 6-drum, 50 gal each. *q Per 90-lb roll. *r F.o.b. factory, Chicago. *s Truckload. *t Incl. Federal tax. *u Per 90-lb square. *v Per ton. *x Ready-mixed. *y 55-gal container. *z Drums. *aa 15 lb. *bb Roofers coating and cement. *cc LCL, truck delivery. *ee Asphalt pitch in 100 lb package *ff 5-ga drums. *gg F.o.b. factory. *hh Incl. freight. *ii Per 324 sf roll. *jj Asbestos roof coating. *kk less 2% disc., 10th. *mm less 2% disc., 10 days. *oo 100 lb bbls. *pp 50 or 100 lb bags. *qq 500 lbs or more *rr F.o.b. plant, Detroit. *ss 50 lb bbls. *tt 25 lb kegs. *uu 250 lb bbls. *xx Sept.: Rolls revised to $2.75, Asph. Felt revised to 1.71. *yy Sept. revised to $12.00. * zz Sept. revised to $2.80. *A 400 lb barrels. *B ASTM Spec. D962-49. *C 95%. *D Std. black. *# Milt. spec.: E TTP27; F TTY91; G TTP31. *H less 2% disc., cash. *I Per 100 lb. *J less 1% disc., 10 days. *K add 2% sales tax. *L CL. *M 1 ton or more. *N under 500 lbs, add $1. *O 50 lb. bag. *P Sept. revised to $2.43. *Q Sept. revised to $3.23.

PLASTER, VERMICULITE AND METAL BUILDING SHEETS & TUBING

	PLASTER‡ Neat per ton	Gauging per ton	VERMICULITE‡ Home Insulation pellets	Plaster aggregate	Concrete Aggregate Untreated	PERLITE‡ Plaster Aggregate	Concrete Aggregate Untreated	ALUMINUM Flat .100" th 36"x108" & 48"x144" per lb/t	SHEET† Corr roof .032" th 36"x12' per shu	STAINLESS STEEL† SHEET-TYPE 302*g* 20 ga 48"x96"-120" per cwtmh	28 ga 36"x120" per cwtmm	COPPER WATER* TUBING-TYPE L 2000 ft lots per ft ½" b	½" c
					—per bag of 4 cu ft—								
Atlanta	$32.00*ss*	$42.00*ss*	$1.55*sss*	$1.65*sss*	$1.80*slss*	$1.65*ss*	$1.65*ss*	$0.463*noo*	$27.17*nY*	$65.68*nxx*	$74.43*nxx*	$0.1762*ss*	$0.2464*ss*
Baltimore	24.00	35.70	0.95	1.15	1.15	1.15	1.55	0.462	0.451*r*	63.00	71.25	0.16	0.23
Birmingham	37.00*ss*	43.00*ss*	1.55*ss*	1.55*ss*	1.60*lss*	1.27*ss*	1.27*lss*	0.458*M*	9.62 *K*	67.34 *K*	76.09 *K*	0.20*ss*	0.27*ss*
Boston	24.00	30.00	1.40	1.40	1.40	1.55*ss*	1.55*ss*	0.462	29.35*p*	64.42*dd**zz	72.67*dd*	0.1762*ss*	0.2464*ss*
Chicago	26.80*tt*	26.80*tt*	1.55	1.60	1.60*l*	1 60	1.60	0.516*x*	32 80*p*	64 15*ee*	72.40*ee*	0.1814	0.2545
Cincinnati	23.85**ss*	23.85*	1.75**ss*	1.75**ss*	1.75**ss*	1.85*ss*	1.90*ss*	0.514	9.21	65 30*zz*	74.05*zz*	0.1814*ss*	0.2545*ss*
Cleveland	28.00 *N*	45.00 *N*	1.14*ss*	1.16*ss*	1.24*lss*	1.45*ss*	1.45*ss*	0.455*aa*	8.48	63 33*oozz*	71.58*oozz*	0.1814*tt*	0.2545*tt*
Dallas	30.65	30.65	1.05	1.21	1.37	1.21	1.32	0.452	0 451*r*	64 09	72.34	0.1668	0.1986
Denver	27.00	27.00	1.50	1.40	1.50	1.50*ss*	1.60*ss*	0.475	10 89	65 32*gg*	73.57*gg*	0.1772	0.2380
Detroit	28.00*ss*	28.00*ss*	1.27*ss*	1.31*ss*	1.40*ss*	1.45*ktt*	1.50*ktt*	0.475*x*	10 35*a*	63 00*azz**	71.25*azz**	0.2058	0.2887
Kansas City	30.00	35.00	1.19*E*	1.21*E*	1.29*lE*	1.21	.....	0.463	23.20*ggyy*	67 50*E*	76.25*E*	0.1814	0.2545
Los Angeles	27.00*tt*	28.00*tt*	1.25*ktt*	1.20*k tt*	1.25*tt*	1.11	1.11	0.515	10.26*Z*	65 02	73.27	0.1814	0.2545
Minneapolis	35.00*F*	35 00*F*	1.65*tt*	1.80*F*	1.95*F*	1.40*S*	1.50*S*	0.468	16.23	63 61*GR*	69.61*ffG*	0.1446†	0.2025
Montreal	27.60*h*	35.60*h*	1.25*h*	1.40*h*	1.50*h*	1.15*v*	1.15*v*	43.95*AH*	12.10*H*	65 75*H*	.....	0.1840	0.2187
New Orleans	34.00	48.00	1.25*P*	1.35*P*	1.25*P*	1.21*P*	1.21*P*	0.526	24.90	64.00*Y*	85.60*Y*	0.1814	0.2545
New York	27.00	35.00	1.40	1.35	1.40	1.35	1.45	0.485*aT*	0.2466*a X*	64.08*a*	72.33*a*	0.1814	0.2545
Philadelphia	26.50	31.00*ss*	1.40*ss*	1.40*ss*	1.40*lss*	1.35*ss*	1.35*qss*	0.485	9.46	63.71	71.96	0.1814	0.2545
Pittsburgh	30.00*nn*	33.00*nn*	1.50*nn*	1.50*nn*	1.50*mm*	1.50*nn*	1.50*nn*	0.452	9.46	64.00	76.25*pp*	0.1441	0.1800
St. Louis	30.00*uu*	41.00*uu*	1.50*uu*	1.60*uu*	1.65*uu*	1.60*uu*	1.60*uu Y*	0.475	10.69	65.39 *Kmm*	71.89*yuu*	0.1814*fmss*	0.2545*fmss*
San Francisco	29.50*ss*	30.50*ss*	1.38*ss*	1.38*ss*	1.80*ss*	1.38*ss*	1.58*ss*	0.575	10.83	65.00 *K*	77.25 *K*	0.1814	0.2545
Seattle	42.40*nn*	45.00*nn*	1.55*nn*	1.25*knn*	1.85*lnn*	1.50*k*	.....	0.46*D*	10.40*D*	74.02*D*	73 27*D*	0.1756	0.2460
Toronto	.82	1 31	1.45	1.60	1.60	1.20*Q*	.....	0.4295	26.00*ap*	73.74	86 52	0.3001	0.3339

‡trucklots, delivered †fob warehouse *fob city *a delivered *b ½" O.D. *c ⅝" O.D. *d per sf *e 34" x 60" sheet *f per 100 ft *g 5 tons & up; cold roll, anneal & pickled 2B finish *h incl. Federal tax *i add 25¢ for pint of additive *j 1100 & 3003 alloy, mill finish *k bag of 3 cu ft *l treated with air entraining agent *m 2-10M ft *n fob mill fr equalized with nearest stocking competitor *o 250 sacks or more *p 100 sq ft *r per lb *s 30 lb bag *t 36" x 108";-10.81 lb/sh; 48" x 144"; 21.7 lb/sh *u 19.31 lb/sh *v fob plant *w 48" x 144" *x 0.11"th *y 27 gauge *aa 16M lb & up *bb Per 50 lb bag *dd add $1.00 cwt boxing *ee 4 tons & up *gg add $2/cwt boxing; $0.75/cwt on skids *hh Theoretical wt for 48" x 96"; 60.4-lb. per sh *ii 300-bag lots *jj 100-lb bag *mm Theoretical wt; 19.7-lb per sh *nn 2% cash *oo skid packed *pp type 304 *qq Philadelphia and suburbs. *rr less 2% disc. 15 days. *ss less 2% disc. 10 days. *tt less 2% disc. 10th. *uu add 2% sales tax. *vv Type N. *xx less ½% disc. 10 days. *yy .021 ga. *zz .061" th. *A Per 100 lb. *C 15M lb. *D less ½% for cash. *E Quantity differential. *F less 5% disc. 10th. *G less ½% disc. 10th. *H Fed. tax exempt. *K less ½%, 10 days. *L 5% disc. 30 days. *M 3003; .452 for 1100. *N less 2% 15th mo. *O less $2, cash & carry. *P less 2%, 15 days. *Q per ton. *S add .10/bag under 200 bags. *T 5000# quantity on 4000# skids. *U 30 Msf quantity; $0.245 in 10 Msf quantity. *X per sq ft. Y Per sheet. *Z 6,000 lb or over.

600 hp Michigan replaces tandem-pushers on Hugh Steele Inc. highway job

Earns $126 extra per hour

"Earning their keep!?! Why, in a year, I could run them into the middle of the Chattahoochee River, and still walk away with a profit!"

Hugh Steele is talking about three rubber-tired Michigan Dozers that are making their mark in big, bold dollar signs all around his 18.1 mile highway contract near Ashburn, Georgia.

Biggest profit producer is in the cut. It's a *600 hp* Michigan Model 480! This big rig started out in demonstration against two 190-hp crawlers push-loading in tandem. The results were so one-sided Mr. Steele wouldn't let Atlanta distributor Stith Equipment Co. take the Michigan off his job.

Scales, stop watch tell the story: 14 more loads per hour

With scales and stop watches, this production story was recorded:

Material	Model 480 Sandy clay (3000 lbs/yd)	Tandem Crawlers Sandy clay (3000 lbs/yd)
Scraper capacity (each of 12 machines)	25 yds heaped	25 yds heaped
Average load time	30 seconds	44 seconds
Pusher cycle time	60 seconds	84 seconds
Average payload, scale weighed	60,000 lbs	48,600 lbs
Average pay yds	20.0	16.2
Scraper loads per 50-min hr.	50.0	35.7
Scraper output per 50-min hr.	1,000.0 yds	578.3 yds

In terms of cold cash, these figures mean simply that the Michigan *earns more dollars per hour*. A lot more! In 30c dirt, its *extra earnings* average *$126 per hour* over tandem pushers, according to Mr. Steele.

Faster pushing nets bigger pay loads

Watch a few push-loading cycles and you'll see why. The Model 480 has half again as much power as the two crawler-pushers *combined*. It backs up faster than crawlers, and being one machine instead of two, naturally positions faster (24 seconds faster, on the average, on this job). It pushes faster (at speeds up to 5 mph), which both reduces load time and keeps the dirt more "alive." Result: higher, tighter, bigger loads—and more of them.

Other Michigans save time on fill-compaction assignment

Just as the big Model 480 is producing profits in the cut, so too are two other Michigan Dozers saving money for Owner Steele on the fill. These units are both 262 hp Model 280's. They are spreading fill and compacting . . . achieving specified 95% Proctor in two to three high-speed (7½ mph) passes.

Speed scattered odd jobs

And that's not all. Go-anywhere 28 mph mobility allows the Michigans to sneak away from main assignments to tackle emergency jobs. Towing disabled vehicles, for example. Back-filling around culverts. Building up low spots in haul roads.

These are just a few of the odd jobs. *But the real advantage of Michigan Dozers*, Mr. Steel says, *is their ability to outperform crawlers on many production jobs too.* And do it day after day, with dependability equal to that of Michigan Tractor Shovels. There are four size Dozers to choose from: 162, 262, 375, and 600 hp. Your Michigan Distributor will be glad to show you one in action so you can judge its advantages for yourself.

Michigan is the registered trademark of

CLARK EQUIPMENT COMPANY

Construction Machinery Division

CLARK® EQUIPMENT

2401 Pipestone Road
Benton Harbor 16, Michigan

In Canada:
Canadian Clark, Ltd.

Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, MARIE MORAVSIK, ELAINE CHOMYAK, ELIZABETH WERRA, ELEANOR QUERET, Reports, J. H. WEBBER, E. R. HUBER, Statistics.

NEW ENGLAND

HEAVY CONSTRUCTION—BA

▲ **Conn., Hartford**—BA 3/3—Bd. Contract & Supply, Metropolitan Dist., 115 Broad St., pressure conduit storm drain and sanitary sewer, under N. Y., N. H. & H. R.R., in Ledyard St. Airport Rd. and South Meadows, Hartford, 1½ mi. conduit to ease overflow of storm water in South Meadows, from South Meadows Pumping Station near Victoria Rd. and Wethersfield Ave. to Airport Rd. vicinity, incl. 2,630 ft. 126 in. rein.-con. pipe. $1,278,200. CD 4/15.

BUILDINGS—BA

Conn., Bridgeport—APARTMENTS—BA 3/3—Park Ave. Cooperative Apartments, Inc., c/o Victor Civkin, archt., 12 Ermine St., Fairfield, 7 story, 55-unit stone, brick apartments, 2604 Park Ave. $700,000. CD 2/26.

▲ **Mass., Ware**—SCHOOL—BA 3/10—High School Bldg. Comm., School Dpt. Office, Town Hall, high school, Palmer Rd. $1,400,000. Plans deposit $100. Alderman & MacNeish, 594 Riverdale Rd., West Springfield, Mass., archts. CD 7/1.

▲ **Mass., Amherst**—SCIENCE BLDG.—BA 3/11—Commonwealth of Mass., Dpt. Educ., Div. Bldg. Constr., 18 Chauncy St., Boston, U-57-1, Contr. 2, science bldg. (3rd section), University of Massachusetts. $1,524,000. Plans deposit $100. Desmond & Lord, 6 Beacon St., Boston, archts. CD 12/19/57.

▲ **Mass., Boston**—MUNICIPAL AUDITORIUM—BA 3/23—Municipal Auditorium Comm., 44 School St., auditorium, Prudential Center Site, Boylston and Dalton Sts. $10,000,000. Hoyle, Doran & Berry, 248 Boylston St., archts. (**Correction**—bid date). CD 2/8.

BUILDINGS—LB & CA

▲† **C. W. Regan, Inc.,** 327 Howes St., Brooklyn, N. Y., CA **$2,264,000,** est. $2,000,000-$3,000,000, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY, ENG-19-016-60-37, HANOVER, N. H. U. S. Eng., 424 Trapelo Rd., Waltham, Mass. Bids Jan. 19. CD 1/21, under LB.

▲ **Rowland Cochraine,** Meadowood, Southington, Conn., Owner Builds, **$1,560,000,** 156 HOUSES, "Meadowood," Second Section, Laurel Lane, SOUTHINGTON, CONN. CD 9/10.

MIDDLE ATLANTIC

BUILDINGS—BA

▲ **Pa., Phila.**—HOSPITAL—BA 3/3—General State Auth., 18th and Herr Sts., Harrisburg, 200-bed TB hospital, Henry R. Landis State Hospital, Corinthian and Girard Sts. $3,756,000. Plans deposit $100. Engineering Consultants, 843 N 19 St., Phila., Zone 30, archts. and engrs. CD 11/13.

▲ **N. Y., Brooklyn**—SCHOOL—BA 3/17—Bd. Educ., City of New York, Bureau Constr., 42-15 Crescent St., Long Island City, N. Y., general contract, plumbing and drainage, incl. heavy kitchen equip., heating and ventilating, electrical work and lighting fixtures for modernization P.S. 29, Henry, Baltic and Kane Sts. Plans deposit $25 general; $10 each, plumbing and drainage, electrical work and lighting fixtures, and $8 for heating and ventilating. CD 3/4.

▲ **Pa., Phila.**—POLICE ADMINISTRATION—BA 3/25—Dpt. Procurement, City Hall Annex, Bid 4299, general constr.; Bid 4300 plumbing work; Bid 4301 air conditioning, heating and ventilation; Bid 4302 electrical work for Police Administration Bldg., 7 and 8 Sts., Race to Cherry Sts. for Dpt. P. Property. Plans deposit $250. CD 2/12.

HEAVY CONSTRUCTION—LB & CA

▲ **Johnson Drake & Piper, Inc.,** 86 Trinity Pl., New York 6, N. Y., CA **$1,254,400,** Section No. 6 of approach roadway sys. in New York City for lower level expansion of George Washington Bridge, Contr. GWB-190.007, NEW YORK and NEW JERSEY. Port of New York Authority, Rm. 1100, 111 Eighth Ave., New York 11, N. Y. Bids Jan. 26. CD 1/28, under LB.

▲ **George M. Brewster & Son, Inc.,** 275 W. Fort Lee Rd., Bogota, N. J., CA **$3,883,843,** George Washington Bridge lower level expansion, Phase 5, between Lemoine and Hoyt Aves. and removal of existing Administration Bldg. which lies in path of eastbound roadway, Contr. GWB-190.028, NEW YORK and NEW JERSEY. Port of New York Auth., 111 Eighth Ave., New York 11, N. Y. Bids Jan. 19. CD 1/21, under LB.

▲ **Arthur Venneri Co.,** 300 North Ave. East, Westfield, N. J., CA **$1,018,877,** Contr. PN-560.007, Bldgs. 263 and 264, PORT NEWARK, N. J. Port of New York Auth., 111 8th Ave., New York 11, N. Y. Bids Feb. 9, awarded Feb. 11. CD 2/11, under LB.

▲ **C. J. Langenfelder & Son,** 8427 Pulaski Hy., Baltimore 21, Md., CA **$3,403,469,** 29th St. Interchange of Jones Falls Expressway, BALTIMORE, MD. City of Baltimore, Expressway Div., Bureau Hys., 303 Municipal Bldg., Baltimore 2, Md. Bids Jan. 27, awarded Feb. 10. CD 1/29, under LB.

BUILDINGS—LB & CA

▲ **Rowe Gian,** 210 Cornwall St., Buffalo, N. Y., CA Est. **$4,500,000,** 3 story suburban DEPARTMENT STORE, AMHERST, N. Y. Northtown Plaza, Inc., c/o contractor. Stanley C. Podd & Assocs., 361 Delaware Ave., Buffalo, N. Y., archts. Hens & Kelly, lessee. CD 2/6/57.

▲ **D. Fortunato, Inc.,** 11 Garfield Ave., Floral Park, N. Y., CA **$3,548,817,** JUNIOR HIGH SCHOOL, LINDENHURST, N. Y. Bd. Educ. Union Federated School Dist. No. 4, Town of Babylon, Lindenhurst High School, 350 Wellwood Ave., Lindenhurst, N. Y. Bids Feb. 2. CD 1/8.

▲ **Merritt & Holby, Inc.,** 225 Westchester Ave., Port Chester, N. Y., CA Est. **$1,000,000,** 100,000 sq. ft. SHOPPING CENTER, Ridge St. and Bowman Ave., PORT CHESTER, N. Y. Rye Ridge Shopping Center, c/o contractor. Meyer-Kasindorf, 1030 Chestnut St., Valley Stream, N. Y., archts.

Blake Constr. Co., Inc., 33 E St. S.W., Wash., D. C., LB **$845,000** (11 bidders), REPAIR SHOP and ENGINE CO., 7 Half St. and M St. S.W., WASH., D. C. D. C. Govt. Buildings & Grounds, 499 Pa. Ave. N.W., Wash., D. C. Bids Feb. 11 CD 1/20

SOUTH

BUILDINGS—BA

▲ **La., New Orleans**—SHOPPING CENTER—Bids Asked—Interchange Realty Co., Inc., 2110 American Bank Bldg., shopping center. Over $5,000,000. Curtis & Davis, 2475 Canal St., archts. CD 2/10.

HEAVY CONSTRUCTION—LB & CA

▲ **NORTH CAROLINA**—State Hy. Comn., Raleigh, N. C.—**Rea Constr. Co.,** 209 W. 4th St., Charlotte, N. C., CA **$1,608,732,** CABC and 9 in. concrete pavement 8.4 mi. surfacing on Interstate Rte. 40 from point between US 221 and NC 26 south of Marion, east to point 4 mi. west of Glen Alpine, Proj. 8.18526, I-40-2(24)86, McDowell and Burke Counties; N. C.—**Barrus Constr. Co.,** Kingston, N. C., CA **$510,193,** CABC, S.A. base, b. conc. surf. 2.14 mi. addnl. lane, US 70 from NC 101, Havelock, southeast 2.142 mi., Proj. 8.12068, F-64(9), Craven Co. Bids Feb. 2. CD 2/5, under LB.

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; Industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of Interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK

Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.
BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.

SOON LETS CONTRACT: SLC

LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

CD dates shown are of Construction Daily Issue in which last previous report was published.
OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

† Federal Government
▲ Project of $1,000,000 or over.
ENR Engineering News-Record
CD Construction Daily

For additional reports see Construction Daily.

▲ **FLORIDA**—State Rd. Dpt., Tallahassee, **R. H. Wright, Inc.,** Box 8068, Seminole Annex, Fort Lauderdale, Fla., CA **$1,053,484,** limerock base, Type 1 b. conc. surf. course with binder course 0.88 mi. SR 25 State Proj. Job No. 87090-3505, Dade Co. Bids Sept. 29, awarded Feb. 11. CD 10/5, under LB.

▲† **U. S. Eng.,** Box 4970, Jacksonville 1, Fla., U.S.A., rejected bids Dec. 15, surplus commodity housing, Kindley Air Force Base, ENG-08-123-60-16, BERMUDA. LB **$4,777,000.** CD 12/23, under LB.

BUILDINGS—LB & CA

▲ **Ralph E. Bush Constr. Co.,** Flatiron Bldg., Norfolk, Va. and **John Halperin & Co., Inc.,** 89-48 164 St., Jamaica, N. Y., Owner Builds, **$2,000,000,** 12 story, 163-unit APARTMENT, NORFOLK, VA. Samuel Paul & Seymour Jarmul, 89-51 164 St., Jamaica, N. Y., archts.

▲ **Crump, Inc.,** 4031 Bigelow Blvd., Pittsburgh 13, Pa., LB **$2,374,900,** St. Joseph's HOSPITAL addn., alterations, PARKERSBURG, W. VA. St. Joseph's Hospital, 19th and Murdoch Ave., Parkersburg, W. Va. Bids Feb. 9. CD 2/3.

▲ **Jack Culpepper Constr. Co.,** 114 E. 5 St., Tallahassee, Fla., CA **$1,559,894,** annex to existing COURTHOUSE, TALLAHASSEE, FLA. Bd. Comrs. Leon Co., Courthouse, Tallahassee, Fla. Awarded Feb. 9. CD 1/5, under LB.

▲ **J. A. Jones Constr. Co.,** Box 13307, New Orleans, La., CA **$1,691,900,** 1 story, mezzanine rein.-con., structural steel, brick, tile and tilt-up wall slab COFFEE PLANT, NEW ORLEANS, LA. J. A. Folger & Co., 330 W. 8th St., Kansas City, Mo. Bids Jan. 20. CD 1/25, under LB.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

▲† **Michigan and Ontario**—BA 3/3—U. S. Eng., 1101 Washington Blvd., Detroit, Mich., dredging in Southeast Bend Cut-Off Channel, St. Clair River, Ontario; approx. 30 mi. northeast of Detroit, Mich., CIVENG-20-064-60-36. Extended date. $9,000,000. CD 2/1.

BUILDINGS—BA

O., Cleveland—SCHOOL—BA 3/9—Bd. Educ., 1380 E. 6th St., Zone 14, elementary school, Whittier Ave. $900,000. Plans deposit $10. Earl Shobe, c/o owner, engr. CD 1/26.

BUILDINGS—SLC

▲ **O., Oberlin**—KING MEMORIAL HALL—Oberlin College, Oberlin, soon lets contract first section King Memorial Hall. $5,000,000-$6,000,000. Moore & Hutchings, 800 2nd Ave., New York, N. Y., archts. CD 9/26/57.

HEAVY CONSTRUCTION—LB & CA

▲ **WISCONSIN**—State Hy. Comn., State Office Bldg., Madison, Bids opened 2/9,
Wis.—**James Cape & Sons,** 701 Water St., Racine, Wis., LB **$1,017,121** (10 bidders), grade, base, concrete pavement and Structure B-40-79, 1.073 mi. West Silver Spring Dr. (North 51st St. to North 33rd St.), Contr. 1, Proj. US 0822 (8), Milwaukee Co.
Wis.—**O'Keefe Constr. Co.,** De Pere, Wis., LB **$355,230** (13 bidders), grade, subbase and concrete pavement 1.665 mi. Lake Delton-Madison Rd. (U.S.H. 12 Interchange), Interstate Hy. 90, Contr. 1, Proj. I-90-2 (37) 91, Sauk Co. CD 1/22.

BUILDINGS—LB & CA

† **Charles H. Shook, Inc.,** 582 W. 2nd St., Dayton, O., LB **$824,313** (17 bidders), METALLURGICAL FACILITY, Mound Laboratory, MIAMISBURG, O. Atomic Energy Comn., Germantown, Md. Bids Feb. 4. CD 1/12.

▲ **The Ghard Co.,** Second National Bank Bldg., Akron, O., Own Forces, **$2,000,000,** 125 addnl. HOMES, Bermont Manor, MUNROE FALLS, O.

▲ **Coath & Goss, Inc.,** 5103 W. Lake St., Chicago 44, Ill., LB **$1,647,685,** general contract, HAWLEY ST. HIGH SCHOOL and addn. to HIGH SCHOOL, LIBERTYVILLE, ILL. Liberty-Fremont High School, Butler Lake Bldg., Libertyville, Ill. Bids Feb. 4. CD 1/8.

▲ **C. W. Babcock & Sons,** 9341 Chalmers St., Detroit, Mich., CA Est. **$4,000,000,** 8 story APARTMENT (1st section), East Jefferson Ave., DETROIT, MICH. Casa Balcona, c/o contractor. CD 11/2, under Charles W. Babcock, as owner.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

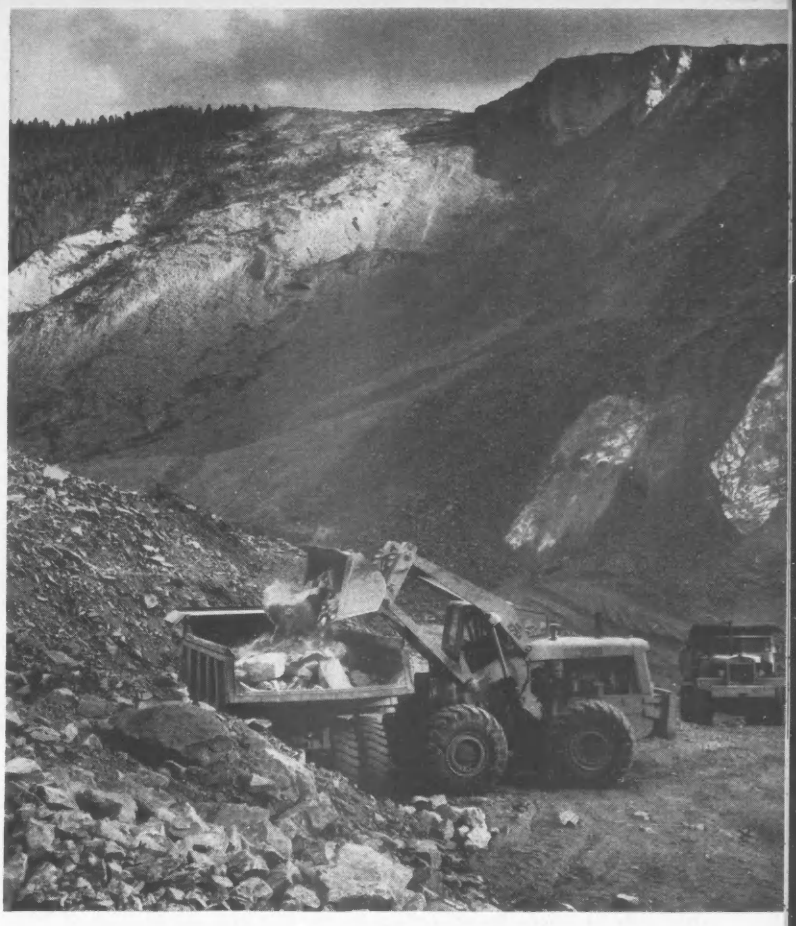
† **Wyo., Cheyenne**—DORMITORIES, etc.—BA 3/15—U.S. Eng., 1709 Jackson St., Omaha, Neb., rehabilitate airmens dormitories and dining hall, Francis E. Warren Air Force Base, ENG-25-066-60-

▲† **South Dakota**—BA 3/31—U.S. Eng., 1709 Jackson St., Omaha 2, Neb., earthwork Stage I, Big Bend Reservoir Project, Fort Thompson, Missouri River, CIVENG-25-066-60-61, $4,000,000. CD 9/29.

(Continued on page 80)

Earthquake dumps 43 million yds of rock into canyon, creates 300 ft. dam in minutes

August 17, 1959—the fourth largest earthquake ever recorded in the history of the United States. At 11:38 pm a mountain split in two. Over 85 million tons of rock, dirt and trees cascaded into the Madison River Canyon near Yellowstone Park. In a few minutes a 300 ft high earthen dam had been "built." Beneath it, a public camp ground and a mile of Montana highway. After rescue work, the big problem was control of the water building up behind the natural dam structure.



4½ yd Tractor Shovel loads 5,500 tons per day to shape nature's work

The "quake," it turned out, had deposited *3 million yards* of dirt and rock across the valley. To curtail flood danger, at least 2 million yards of this would have to be moved. Time was at a premium. Work had to be completed before the severe winter set in and spring thaws and rains came.

Leveling the slide crest and building a spillway involved moving a million yards of rock. But, before this was completed, the five-mile-long backwater lake topped the crest. Rushing waters created 15 to 20 ft erosion channels from the top of the "dam" down the unfinished spillway.

4½ and 6 yd Tractor Shovels do swing shovel work

A stilling basin had to be built in a hurry to slow down the wild water and re-direct it into the old river channel. Another million yards of rock had to be moved. More equipment was called Corps of Engineers. Now, 61 pieces of heavy earthmovers and trucks were on the job. Included were four large-capacity, 4½ and 6 yd Michigan Tractor Shovels. *Their mobility, and the ability to perform a task formerly considered strictly in the realm of swing shovels turned the tide.* The Michigans worked continually in rock, loading from narrow ledges on the unstable face of the slide.

One Michigan keeps 10 to 15 trucks busy

Zook Brothers Construction Company, of Big Fork, Montana, was one of the major contractors using a Michigan. Working two 11-hour shifts a day, seven days a week, their 4½ yd Model 275A loaded out an average of 5,500 tons of rock per day from a work area located near the bottom of the slide and flush with the mountain from which the rock fell. Ten to fifteen 27 yd rear-dumps carried the Tractor Shovel's production down a long winding ac-

3 to 4 passes load each truck

In rock, up to 1¼ yds per chunk, the Michigan loaded an average of 10 haul units per hour. Loads ranged from 15 to 17 yards each. Glenn Zook, partner of the firm, said, "The Michigan's digging ability and bucket action let us heap-load. We got good production every hour of the job."

Perhaps you could use Michigan Tractor Shovel stamina, capacity and rock-loading ability to increase efficiency *on your job.* There are nine Michigan models to choose from—16 cu ft to 6 cu yds, 3,000 to 30,000 lb lift capacities. We'll be glad to give you a "no obligation" demonstration.

Michigan is a registered trademark of

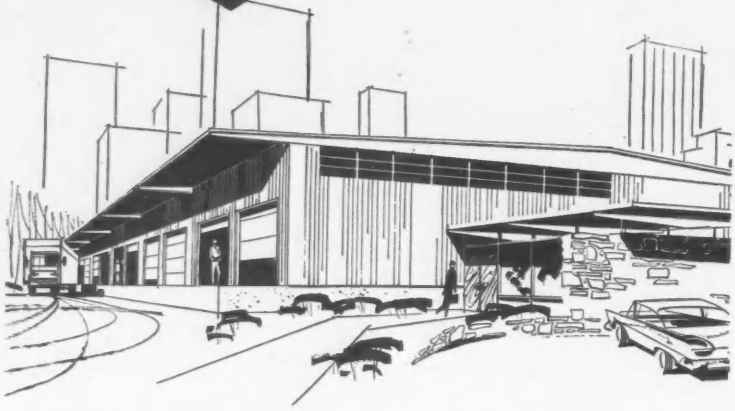
CLARK EQUIPMENT COMPANY
Construction Machinery Division

CLARK® EQUIPMENT

2401 Pipestone Road
Benton Harbor 12, Michigan

In Canada:

INLAND STEEL BUILDINGS



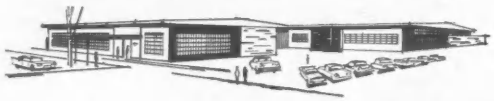
New, significant
cost reductions with

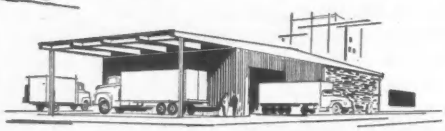
INLAND SLOPE-BEAM BUILDINGS

You save money in many ways, when you use the Inland SLOPE-BEAM concept of design and construction for your new buildings. *You save on steel costs,* because slope beams require less steel than rolled sections for equivalent loads. *You save on the cost of foundations and columns,* because slope beams reduce dead load. *You save time and money on the job,* because framing members are shop-fabricated to your requirements and reduce field work to a minimum.

You can design a clear-span SLOPE-BEAM building in widths from 30 to 80 feet — or twin-span and multiple-span combinations — using any roofing and siding materials. Loading data are available to save you time at the drawing board.

Have your Inland Steel Buildings dealer give you additional details. Send coupon for his name and catalog 4010.





INLAND STEEL PRODUCTS COMPANY

Dept. B, 4147 West Burnham St., Milwaukee 1, Wisconsin

☐ Send me name of nearest Inland Steel Buildings dealer.

☐ Send me catalog 4010.

Name_____

Company_____

Address_____

City_____

County_____ State_____

MB-38

(Continued from page 78)

BUILDINGS—BA

▲ **Wyo., Laramie**—DORMITORIES—BA 4/1—University of Wyoming, Campus, two & story, part bsmnt., 400-unit men's dormitories. $3,025,000. Extended date. Porter & Porter, 1009 East Lincolnway, Cheyenne, archts. CD 1/20.

HEAVY CONSTRUCTION—LB & CA

▲ **Iowa**—State Hy. Comn., Ames, Bids opened 2/9,

Iowa—Central Eng. Co., P.O. Box 838, Davenport, Iowa, LB **$261,951,** c. conc. wid'n., b. conc. resurf., etc. 5.73 mi., FN-217, Scott Co.; LB **$708,272,** c. conc. pavement and wid'n., and b. conc. resurf. 6.823 mi., FN-114, Scott Co.;

Iowa—Kaser Constr. Co., 3111 Ingersoll Ave., Des Moines, Iowa, LB **$184,106,** b. conc. resurf. 9.04 mi. FN-52, Audubon Co.; LB **$328,665,** b. conc. resurf. 15.681 mi. FN-38, Plymouth Co.; LB **$167,223,** b. conc. resurf. 8.452 mi., FN-342, Plymouth Co.;

Iowa—Fred Carlson Co., Highway No. 9 East, Decorah, Iowa, LB **$441,272,** c. conc. 7.126 mi., F-442(8), Fremont and Page Counties. CD 1/27.

▲ **MISSOURI**—State Hy. Comn., Jefferson City,

Mo.—S. J. Groves & Sons Co., 1104 W. Reynolds St., Springfield, Ill., CA **$602,780** graded earth, culverts, etc. 10.343 mi., Christian Co.; CA **$712,580,** graded earth, culverts, etc. 2.486 mi., Greene Co.;

Mo.—I. A. Tobin Constr. Co., 3701 Rainbow Blvd., Kansas City, Kan., CA **$974,451,** graded earth, culverts, 2 multi lanes, concrete pavt. 0.805 mi., Jackson Co.;

Mo.—Peter Kiewit Sons Co., 1525 S. Glenstone, Springfield, Mo., CA **$1,955,612,** graded earth, culverts, 2-24 ft. concrete pavements 10.673 mi. Platte Co.;

Mo.—Howard Constr. Co., 1504 North Osage, Sedalia, Mo., CA **$1,434,300,** graded earth, culverts, b. conc. surf. 10.328 mi., Worth Co.;

Mo.—Trinidad Asphalt Mfg. Co. & Quarry Realty Co., 4030 Chouteau Ave., St. Louis 10, Mo., CA **$507,640,** b. conc. wid'n. resurf. 20.617 mi., Lincoln Co.;

Mo.—Reno Constr. Co., Inc., P. O. Box 61, Overland Park, Kan., CA **$547,388,** b. conc. wid'n., resurf. 16.018 mi., Benton Co.;

Mo.—Union Constr. Co., 1401 Fairfax Trafficway, Kansas City, Kan., CA **$563,218,** b. conc. wid'n., resurf. 16.492 mi., Benton Co.;

Mo.—Fred Weber Cont. Inc., 7929 Alabama Ave., St. Louis 11, Mo., CA **$667,604,** graded earth, culverts, wid'n., part concrete surf., part b. conc. surf. 1.786 mi., St. Louis Co.;

Mo.—Clarkson Constr. Co., 4133 Gardner Ave., Kansas City 20, Mo. and **Union Constr. Co.,** 1401 Fairfax Trafficway, Kansas City, Kan., CA **$195,175,** graded earth, culverts 0.085 mi., Jackson Co. Bids Jan. 29, awarded Feb. 3. Grand total $8,160,748. CD 2/8, under LB.

† **Wilber Nielson Co., Inc.,** 1531 N. Saddle Creek Rd., Omaha, Neb., LB **$846,880,** First Stage, embankment John Redmond Dam, near Burlington, Strawn Reservoir, ENG 34-066-60-25, KANSAS. U. S. Eng., P. O. Box 61, Tulsa, Okla. Bids Feb. 11 CD 1/21.

▲ **KANSAS**—State Hy. Comn., Wichita, Bids opened 2/5,

Kan.—Clarkson Constr. Co., Box 4924, Sta. F, Kansas City 1, Mo., LB **$709,752** (4 bidders), grading 1.72 mi. SP 235-87 I 235-1 (14) 43, Pt. I, Sedgwick Co.;

Kan.—Grosshans & Petersen, Inc., Box 167, Marysville, Kan., LB **$447,821** (5 bidders), grading 1.251 mi. SP 235-87 I 235-1 (35) 49, Pt. I; LB **$569,953** (5 bidders), grading 2.779 mi. SP 235-87 I 235-1 (35) 49, Pt. II, both Sedgwick Co. CD 1/22.

▲ **W. R. Grimshaw Co.,** Enterprise Bldg., Tulsa, Okla., CA **$4,062,589,** airport terminal, TULSA, OKLA. City, City Hall, Tulsa, Okla. Bids Feb. 2. CD 2/9, under LB.

▲† **Cage Bros.,** 6959 San Pedro Ave., San Antonio, Tex., CA **$1,650,420,** sea wall extension, Galveston, CIVENG-41-243-60-35, TEXAS, U. S. Eng., Box 1229, Galveston, Tex. Bids Jan 21. CD 2/4 under LB.

▲† **Technical Constructors, Inc.,** P.O. Box 2488, Dallas, Tex., CA **$1,342,989,** est. $1,500,000, airroute traffic control center at Amon Carter Field, FORT WORTH, TEX. Federal Aviation Agency, Blvd. No. 3, Annex A, Haslet Rd., Fort Worth, Tex. Bids Feb. 9, awarded Feb. 12. CD 2/11.

† **Morgen & Oswood Constr. Co.,** P.O. Box 226, Glasgow, Mont., CA **$722,676,** water treatment plant, utilities and roads at Glasgow Air Force Base, Valley Co., GLASGOW, MONT. U. S. Eng., City-County Airport, Walla Walla, Wash. Bids Feb. 3, awarded about Feb. 10. CD 2/9, under LB.

BUILDINGS—LB & CA

▲ **William H. & Nelson Cunliff Co.,** 3320 Lindell Blvd., St. Louis 3, Mo., CA Est. over **$1,000,000,** 3-level 100,000 sq. ft. OFFICE, south of Olive St. Rd., east of Lindbergh Blvd., CREVE COUER (ST. LOUIS 41 P.O.), MO. Monsanto Chemical Co., 800 N. Lindbergh Blvd., Creve Couer 41, Mo. Bids Jan. 29. CD 11/16.

▲ **Dickie Constr. Co.,** 317 N. 11th St., St. Louis 1, Mo., LB **$1,768,462,** (6 bidders), general contract RELIGIOUS FACILITIES, incl. brick, Indiana limestone, concrete, steel, etc., 150x190 ft. temple, 3 level 77x199 ft. educational bldg., Ladue and Spoede Rds., CREVE COUER (ST. LOUIS 41 P.O.), MO. Temple Israel's Congregation, 5017 Washington Blvd., St. Louis 8, Mo. Bids Feb. 9. CD 1/14.

▲ **Edmond G. Peterson Constr. Co.,** 4540 Lorraine St., Dallas, Tex., CA Approx. **$2,500,000,** 253,895 sq. ft. concrete frame INDUSTRY CENTER, (includes office-exhibit); CA Approx. **$210,000,** UNDERGROUND PARK-

(Continued on page 84)

NEW ROCK-LOADING TEAM BOOSTS PLANT PRODUCTION 25%

Hauler: *13-ton Michigan Tractor Wagon* Loader: *2¾ yd Michigan Tractor Shovel*
Output: *2,400 tons daily on 2 mile cycle*

Four years ago, the Fort Scott Hydraulic Cement Company, Fort Scott, Kansas, began a program to replace their four crawler-loaders and two 10-ton tandem-axle dump trucks with the most modern equipment available.

The program was completed when a 13-ton rear-dump Michigan Tractor Wagon went on the job a year ago. Its addition gave Fort Scott, one of the nation's three major natural cement producers, an all Michigan fleet. The Wagon teams with a 2¾ yd Model 175A Michigan Tractor Shovel in the rock pit. Three other 2¾ yd Michigan Tractor Shovels handle the crushed rock, coal, and clinkers in this 4,500 barrel-a-day natural cement plant.

Tractor Wagon hauls 120 tons per hour

It's the heavy rock loading and hauling operation that Mr. Pat Thomas, president of the 92-year-old firm, points to as being the best example of how the Michigan machines have improved job efficiency.

Shot Florentine limestone is currently being loaded out of the far end of a pit 90 feet wide and 5,000 to 6,000 feet long. This makes the average haul cycle, between pit and crusher, about two miles.

The 162 hp Tractor Wagon's stability and speed of up to 31 mph is a prime production factor in the mile long *uphill* run from pit to crusher. With torque converter and full power shift, power and speed are instantly adjusted to match the load demand.

On two 10-hour shifts, the Tractor Wagon, sideboarded to meet rated capacity, and the highly-maneuverable 2¾ yd Tractor Shovel will load out an average 2,400 tons of rock . . . rock which weighs, when loose, approximately 2,500 lbs per cu yd.

2 Michigans outwork 3 units formerly used

Production in the rock pit has risen 25% since the Tractor Shovel replaced a crawler rig with similar bucket capacity, and the Tractor Wagon took over the job formerly handled by two 10-ton dump trucks.

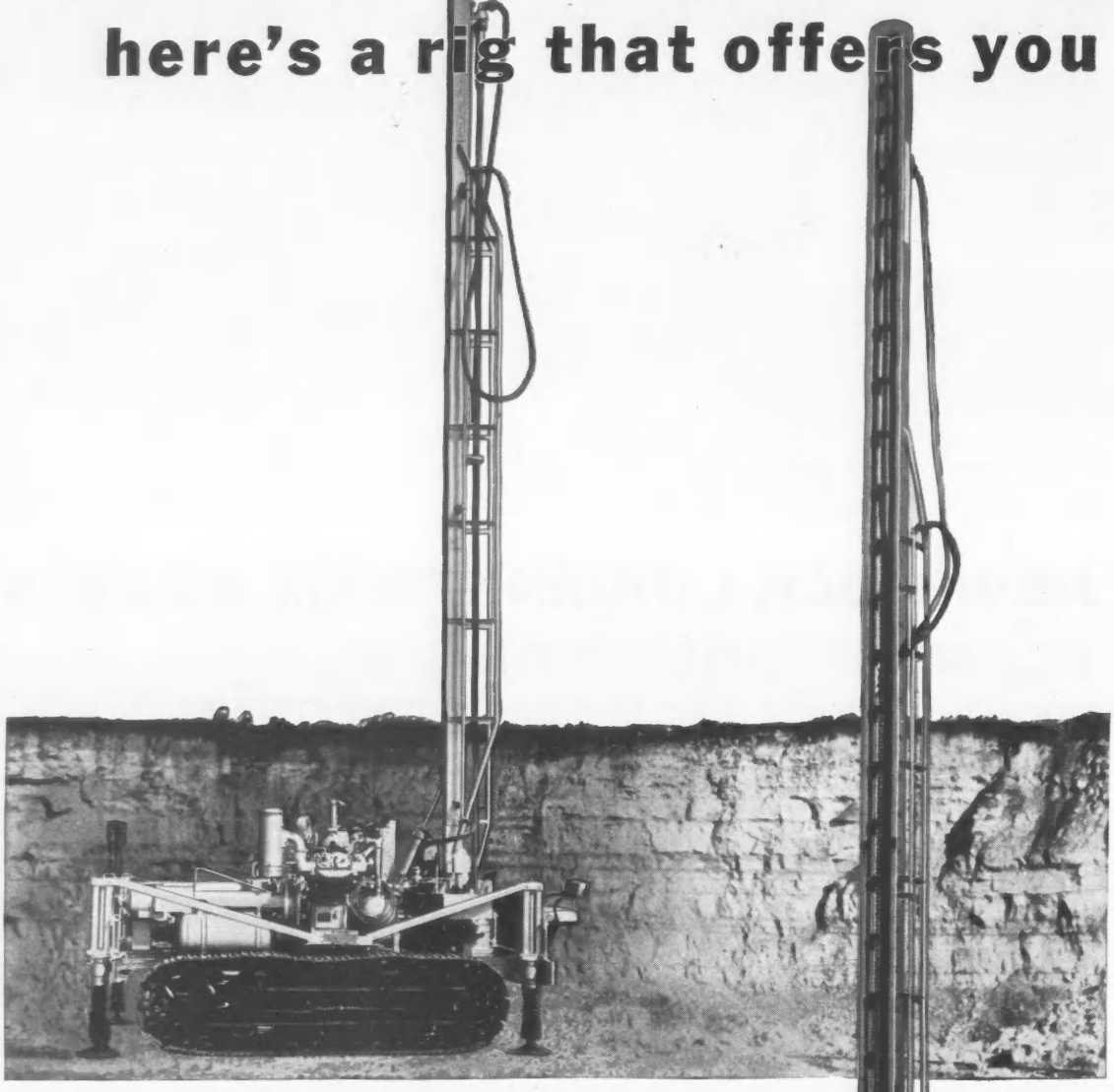
Upkeep "phenomenally small," says president

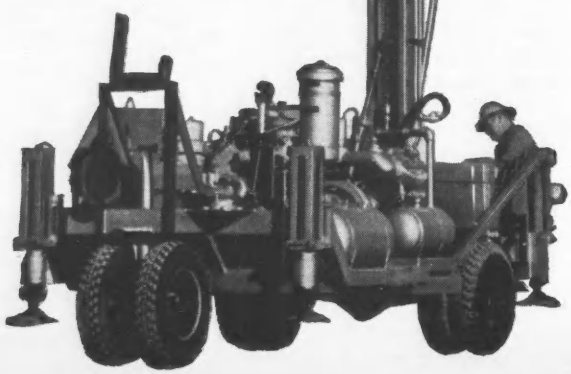
"With all five of the Michigans working constantly with heavy loads and over sharp rock and abrasive cinders, *we have spent less than $2100 on overhauls, parts, tires and labor during the past three years,*" says Mr. Thomas. "I think this figure is extremely low considering what a machine goes through in a cement plant operation of this type. We've had virtually no downtime."

If you're hauling bulky materials off the highway, perhaps a Michigan Tractor Wagon could increase your production, too. When you pair it with one of the eight Michigan Tractor Shovel models (up to 6 cu yds), you've got a team that can't be beat. Let us demonstrate. Just call. There's no obligation, of course.

Michigan is a registered trademark of
CLARK EQUIPMENT COMPANY
Construction Machinery Division
CLARK EQUIPMENT
2401 Pipestone Road
Benton Harbor 13, Michigan
In Canada:
Canadian Clark, Ltd.

If your rock is right for drag here's a rig that offers you





New Gardner-Denver Zephyr—available on wheel or crawler mounting to meet drilling requirements.

bit operations
new drilling economy

NEW GARDNER-DENVER ZEPHYR ROTARY BLAST-HOLE DRILL

Self-Propelled . . . Completely Self-Contained . . . Designed for Fast, Efficient, One-Man Operation

10,000-lb. pulldown—hydraulic pulldown conservatively rated at 10,000-lb. bit pressure. For drilling fast, straight hole in tricky formations, pulldown is regulated by dual hydraulic controls that vary either volume or pressure. Pulldown circuit can be operated continuously at peak loads.

Instantaneous travel control—no lost time in coming out of the hole. While on pulldown or while hoisting, feed rates are changed instantly by use of hydraulic controls. Bit up-travel speeds of 100′ per minute.

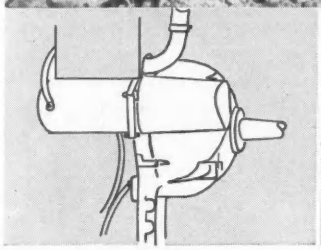
Centralized controls—all controls for drilling and drive grouped at rear of drill for ease of operation.

Heavy-duty rotary table—four speed options varying from 20 to 450 rpm. Rotary sleeve supported by heavy-duty, tapered bearings rated at 25,000-lb. thrust load. Heat-treated spiral bevel gear and pinion run in oil.

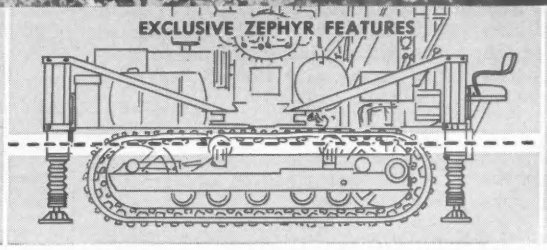
Hole sizes—from 1¾″ to 4¼″ diameters. Kellys available from 1¼″ hexagon to 3″ round.

Air package—Gardner-Denver ACL air-cooled, single-stage compressor rated at 200 cfm displacement. Clutch provided so other components may be operated independently of compressor.

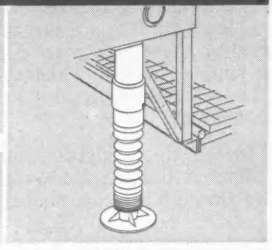
Contact your Gardner-Denver representative for full details.



Torque converter for smoother operation on the road and while drilling.



Track stability—low center of gravity on either model assures maximum safety and stability.



Four hydraulic leveling jacks for faster setups and greater stability.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

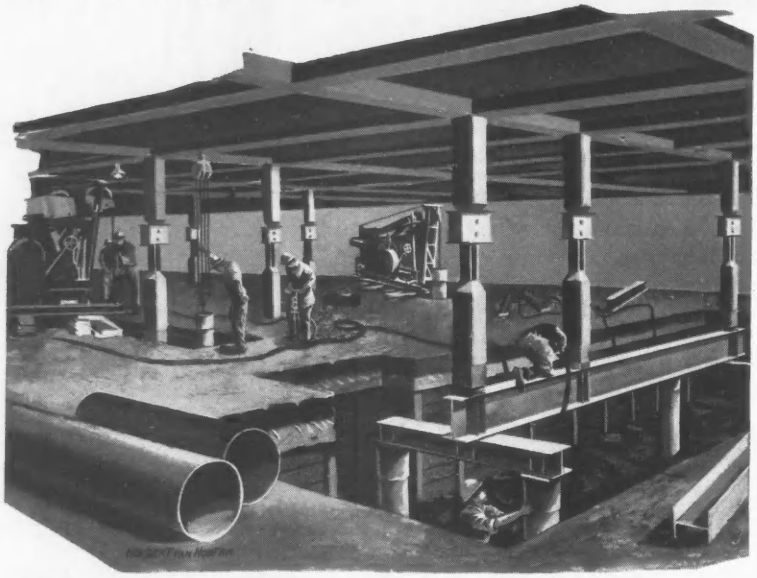
Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

ANOTHER PROBLEM SOLVED BY SPENCER, WHITE & PRENTIS

UNDERPINNING OF PIER POSES MANY CONSTRUCTION PROBLEMS

Timber and rip-rap obstructions—vibration problem—limited headroom — complicate installation of 14-inch Drilled-In Caissons



Project: Underpinning Pier 3, Hudson River, for United Fruit Co.
Owner: Department of Marine & Aviation, City of New York
Engineers: Dept. of Marine & Aviation, Captain L. H. Rabbage, Chief Engineer
United Fruit Co., H. C. Ames, Division Engineer
Consultant: Moran, Proctor, Mueser & Rutledge

Underpinning was required for Pier 3 on New York City's Hudson River. Sketched above is a portion of the new support system, which consists of 14-inch steel pipe piles socketed into bedrock.

To install this underpinning with minimum vibration and to carry the piles through rip-rap, timber cribs and hardpan, specialized drilling procedures were used, the design of the drill rigs being modified to operate in the very limited headroom available.

When you encounter foundation problems, Spencer, White & Prentis is long-practiced in prescribing sound solutions.

CATALOG ON REQUEST

Spencer, White & Prentis INC.

FOUNDATIONS · PILING · UNDERPINNING · SHORING · COFFERDAMS · SPECIAL SERVICES

10 EAST 40th STREET, NEW YORK 16, N. Y.

DETROIT: 2033 PARK AVE. • CHICAGO: 221 NORTH LaSALLE ST. • WASHINGTON, D. C.: TOWER BLDG.
PITTSBURGH: EMPIRE BLDG. • OF CANADA: 2052 ST. CATHERINE ST. WEST, MONTREAL

(Continued from page 80)

ING GARAGE; CA Approx. **$132,000,** above-ground hard-paved AUTO CENTER, DALLAS, TEX. Edmond G. Peterson, 4540 Lorraine Ave. and Bright & Schiff, c/o Commerce Bldg., Dallas, Tex. Grand total $2,842,000. CD 2/3.

▲ **Dow Chemical Co.,** 100 Main St., Midland, Mich., Separate Contracts, **$3,000,000,** STYRENE-BUTADIENE LATEX PRODUCTION UNIT, FREEPORT, TEX. CD 10/29.

W. S. Bellows Constr. Corp., 716 N. Everton St., Houston, Tex., CA **$785,000,** foundation and sub-surface foundation for 44 story OFFICE, HOUSTON, TEX. Humble Oil & Refining Co., 1216 Main St., Houston, Tex. CD 8/11.

▲ **Farnsworth & Chambers Co., Inc.,** P.O. Box 74, Houston, Tex., LB **$1,073,500,** est. $1,000,000, (10 bidders), 3 story, 56,000 sq. ft. concrete frame, brick SCIENCE, PRAIRIE VIEW, TEX. A & M College System of Texas, College Station, Tex. (for Prairie View A & M College). Bids Feb. 9. CD 1/27.

Stackhouse Constr. Co., 6301 West 44 St., Denver, Colo., CA Approx. **$850,000,** RECREATION CENTER in Sunset Plaza Shopping Center, PUEBLO, COLO. Roll-in-Lou, Inc., 155 Centennial Drive, Denver, Colo.

▲ **R. M. Watts,** 3601 Morris Ave., Pueblo, Colo., Separate Contracts, **$3,000,000,** 300 to 400 RESIDENCES, PUEBLO, COLO.

FAR WEST

BUILDINGS—BA

▲ **Calif., San Francisco**—HOUSING—BA 3/10—San Francisco Housing Auth., 440 Turk St., 354-unit low-rent wood frame, stucco Double Rock Housing, incl. 1 story, wood frame, stucco maintenance and administration bldg. $4,288,000. Plans deposit $100. Hertzka & Knowles, 32 Fremont St., San Francisco, Calif., and H. C. Bauman, 251 Kearny, San Francisco, Calif., archts. CD 3/22/56.

▲ **Calif., Palos Verde**—RESEARCH LABORATORY—BA 4/29—Nortronics Div., Northrup Corp., 500 E. Orangethorpe St., 150,000 sq. ft. research laboratory, Palos Verdes Research Park. $4,000,000. Charles Luckman, Assocs., 9220 Sunset Blvd., Los Angeles, Zone 46, archts. CD 7/13.

HEAVY CONSTRUCTION—LB & CA

Vinson Constr. Co., P.O. Box 930, Phoenix, Ariz. CA **$898,133,** water pipe line from reservoir at 64 St. and Thomas to southside of PHOENIX, ARIZ. City, City Hall, Phoenix, Ariz. Bids Jan. 19. CD 12/15.

CALIFORNIA—State Dpt. P. Wks., 1120 N St., Sacramento.

Matich Constructors & W. F. Maxwell, P.O. Box 356, Fontana, Calif., CA **$858,887,** grading, paving to wid'n. San Bernardino Freeway from 4 to 6 lanes between 0.2 mi. east of San Dimas Ave. in Pomona and San Bernardino Co. line at Mills Ave. in Claremont, incl. wid'n. 6 bridges, VII-L.A.-26-C, Pom, Cla., San Bernardino Co. Bids Jan. 28, awarded Feb. 9. CD 2/2, under LB.

▲† **Standard Dredging Co.,** Suite 800, 108 West Sixth St., Los Angeles, Calif., CA **$2,473,288,** dredging and revetment, Ventura County Harbor, Port Hueneme, Ventura Co., ENG-04-353-60-9, CALIFORNIA. U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif. Bids Dec. 15. CD 12/21, under LB.

BUILDINGS—LB & CA

▲ **Johnson Constr.,** 1725 Chicago St., Salt Lake City, Utah, CA **$1,387,000,** SENIOR HIGH SCHOOL, 650 S. 11th E., SALT LAKE CITY, UTAH. R. C. Church, 231 S. Temple, Salt Lake City, Utah. Bids Nov. 25. CD 12/3, under LB.

▲ **Bettilyons, Inc.,** 333 S. 2nd E., Salt Lake City, Utah, CA **$1,200,000,** 108,000 sq. ft. FIELD LABORATORY addn., SALT LAKE CITY, UTAH. Sperry Corp.-Utah Engineering Laboratory, 322 N. 21 W., Salt Lake City, Utah. Bids Jan. 25. CD 4/2/58.

Herbert Goldsworthy, 409 Santa Monica Blvd., Santa Monica, Calif., LB **$890,000** (11 bidders), Trident JUNIOR HIGH SCHOOL addns., Proj. No. 2, 1800 W. Ball Rd., ANAHEIM. CALIF. Anaheim High School Dist., 123 N. Citron St., Anaheim, Calif. Bids Feb. 4. CD 1/20.

Harris Constr. Co., P.O. Box 109, Fresno, Calif., LB **$805,000,** general contract HIGH SCHOOL, incl. GYM, Tully Ave. and College St., MODESTO, CALIF. Modesto City High School Dist., 426 Locust St., Modesto, Calif. Bids Feb. 8. CD 1/12.

▲ **Campbell Constr. Co.,** 800 R St., Sacramento, Calif., CA **$1,964,450,** Will C. Wood JUNIOR HIGH SCHOOL, SACRAMENTO, CALIF. Sacramento City Unified School Dist., 1619 N St., Sacramento, Calif. Bids Feb. 8, awarded Feb. 9. CD 2/11, under LB.

Stolte, Inc., 8451 San Leandro St., Oakland, Calif., CA **$998,400,** 4 story, 41,000 sq. ft. Sutter MEMORIAL HOSPITAL addn., 52nd and F Sts., SACRAMENTO, CALIF. Sutter Hospitals, 2820 L St., Sacramento, Calif. Bids Jan. 19, awarded Feb. 8. CD 1/25, under LB.

CANADA

HEAVY CONSTRUCTION—BA

ONTARIO — BA 3/16 — Dpt. Hys., Parliament Bldgs., Toronto,

Campbellville—granular base, rein.-con. paving 7.37 mi. Hy. 401 from Campbellville interchange to Hy. 6 (Contract 59-333). $900,000. Plans deposit $10.

BUILDINGS—BA

▲ **Man., Brandon** — HOSPITAL — BA 3/17 — Brandon General Hospital Bd., hospital addn. $3,250,000.

(Continued on page 86)

MAXON Dumpcrete Spreaders

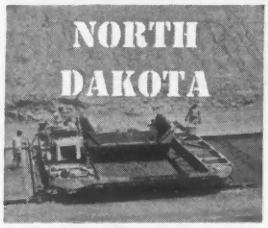
paid their own way in paving savings on projects across the country last season!

Central Contracting Company
Rapid City

C. F. Replogle Company
Circleville

L. Zimmerman & Sons, Inc.
Hillside

Wilson Contracting Company
New Castle



O. W. Swanson Construction Co.
St. Paul, Minnesota

Broman Construction Company
Clarion

Tufano Contracting Company
Babylon, Long Island

C. J. Langenfelder & Son, Inc.
Baltimore, Md.

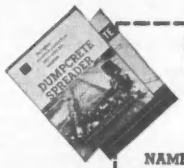
Here's proof of acceptance—proof that Maxon Dumpcrete Concrete Spreaders can sharply reduce paving costs with their "90-seconds-from-truck-to-slab" cycle. This is just a partial list of leading contractors who used the Dumpcrete Spreader last season. Most took full advantage of the benefits of central-mixing by using Dumpcrete Bodies... some used transit-mix trucks.

But the Dumpcrete Spreader paid off both ways. It can for you, too. It spreads, moves and strikes-off a 5½ cu. yd. load in *30 seconds.* (Dumpcrete Bodies load it in 60 seconds.) Places base course, top course or full depth. Paving widths are adjustable from 11 to 16 or 20 to 25 feet. Handles concrete of lowest slumps. Simple design and rugged construction hold maintenance to a minimum.

Find out how Dumpcrete Spreaders can cut costs for you on highway, street, runway or widening jobs. Send now for literature—or call your Dumpcrete distributor.

MAXON

Dumpcrete Hauling Bodies
and
Dumpcrete Paving Spreaders



MAXON CONSTRUCTION COMPANY, INC.
Manufacturing Division E-5 • 2600 Far Hills
Dayton 19, Ohio

Please send me new Dumpcrete Spreader catalog with specifications

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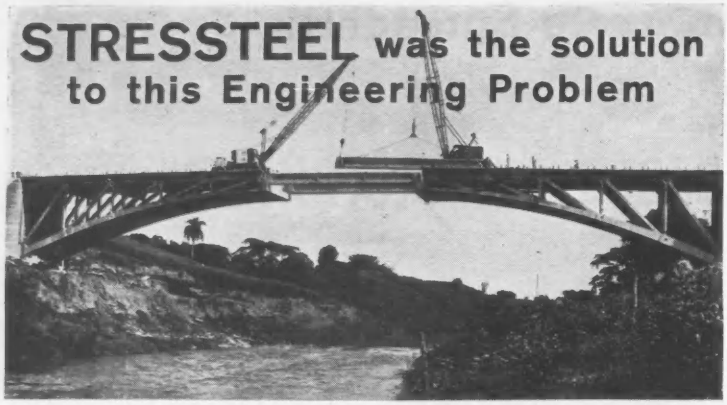
STRESSTEEL was the solution to this Engineering Problem



Zaza River Bridge—Comision de Fomento Nacional, Cuba. This unique bridge, just completed in Las Villas, for the first time uses precast and post-tensioned concrete to form cantilever trusses. Mario G. Suarez—Arango y Salas, Designers and Engineers. Cia. Territorial y Constructora Celo S. A., Contractor.

THE PROBLEM: How to prestress and assemble precast sections for a 300' cantilever concrete truss bridge with maximum efficiency and minimum cost.

THE SOLUTION: First, use STRESSTEEL Bars to post-tension the vertical legs of each precast panel. Next, use STRESSTEEL Bars to form the top chord of each panel and hold the truss together during erection and pouring of bridge deck. Finally, with additional STRESSTEEL Bars, post-tension the entire assembly of panels through the bridge deck to form an integrated truss.

Above—Truss panels precast at jobsite, one-on-top-of-other for accurate duplication.

Right—Assembling truss panels, with STRESSTEEL Bars forming the top chord of each truss.

Imaginative engineers now recognize that the use of light, precast concrete trusses for bridges and buildings offers a new and unexplored field in concrete technology. Rigid STRESSTEEL Bars, easily placed, connected and tensioned are ideal for these applications. These high strength bars are available in sizes from ¾" ⌀ to 1¼" ⌀ with recommended working stress for prestressing up to 90,000 psi. Equipped with wedge or threaded anchors, they offer effective solution to the special anchoring problems of precast units.

You will achieve superior results at substantial savings with STRESSTEEL because it is . . .

- High strength alloy steel
- Low in labor cost
- Low in initial cost
- Easy to tension

Are you working on an application combining precast concrete with post-tensioned prestressing? STRESSTEEL may well be the optimum solution. Write for Technical Bulletin #1

Member—Prestressed Concrete Institute

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Sales Offices: Minneapolis — San Francisco — Havana

(Continued from page 84)

Plans deposit $100. Green, Blankstein, Russell & Assocs., 222 Osborne St. N., archts. CD 11/11.

▲ **Ont., Toronto**—HOSPITAL—Bids Asked—Northwestern General Hospital, Keele St., hospital expansion, $1,000,000. Plans deposit $50. John B. Parkin Assocs., 1500 Don Mills Rd., North York, archts.-engrs. CD 1/19.

HEAVY CONSTRUCTION—LB & CA

▲ **Robert McAlpine Ltd.,** 2249 Yonge St., Toronto, Ont., CA **$2,077,131,** blower and heating bldg., sewage treatment plant, Ashbridge's Bay, TORONTO, ONT. Municipality of Metropolitan Toronto, 67 Adelaide St. E., Toronto, Ont. Awarded Feb. 9. CD 1/25, under LB.

▲ **Dravo Constr. Ltd.,** 159 Bay St., Toronto 1, Ont., CA **$1,343,727,** outfall sewer and ancillary works, Humber Sewage Treatment Plant, TORONTO, ONT. The Municipality of Metropolitan Toronto, 67 Adelaide St., Toronto, Ont. CD 12/16, under LB.

BUILDINGS—LB & CA

Ellis-Don Ltd., Box 852, London, Ont., CA **$702,600** (10 bidders), two wing, 40,000 sq. ft. COLLEGIATE addn., ST. THOMAS, ONT. Central Elgin Dist. High School Bd., St. Thomas, Ont. Bids Feb. 2, awarded Feb. 9. CD 1/25.

LATIN AMERICA

HEAVY CONSTRUCTION—BA

▲ **EL SALVADOR**—BA 2/29—Ministry P. Wks., Proveedor Especifico de Obras Publicas, Edificio Morazan 8a C.P., San Salvador,
constr. major portion of proposed Feeder Road Program of the country. $10,000,000. Extended date. CD 1/29.

AMERICANS ABROAD

BUILDINGS—LB & CA

▲ **Badger N. V.,** The Hague, The Netherlands (sub. Badger Mfg. Co., 230 Bent St., Cambridge, Mass., U.S.A.), CA Est. **$2,000,000,** design and construct 5,000 metric ton per year PHTHALIC ANHYDRIDE PLANT, Schoonaarde, BELGIUM. Union Chimique Belge S.A., Brussels, Belgium.

▲ **Westinghouse International Co.,** 40 Wall St., New York, N. Y., U.S.A., CA Est. **$14,300,000,** design and construct 60,000 kw. STEAM ELECTRIC POWER STATION at Surabaya, East Java, INDONESIA. Republic of Indonesia, Jakarta, Indonesia.

▲ **Cementation Co. (Overseas Ltd.),** London, England, CA Est. **$9,800,000,** 15 story HOTEL, swimming pool, near TEHERAN, IRAN. Pahlavi Foundation of Iran, Teheran, Iran. Feroughi, Zafar, Ghiai & Zadeh, Teheran, Iran, archts. Hilton Hotels, International, Waldorf Astoria, New York, N. Y., U.S.A., will operate.

PROPOSED PROJECTS

WATER SUPPLY

▲ **Minn., Roseville**—Village, Village Hall, WW sys. $5,000,000. To go ahead 1962.

▲ **N. C., Wilkesboro**—Bd. Supervs. Wilkes Co., Courthouse, reservoir, North Wilkesboro. **$1,200,000.**

▲ **O., Columbus**—City, City Hall, 48 in. water main from Hoover Dam to east and south sides, from Morse Rd. to 7th Ave. **$1,225,000.** Burgess & Niple, 2015 W. 55th St., consult. engrs. CD 9/10.

▲ **Tex., Perryton**—Palo Dura River Authority, c/o Freese, Nichols & Endress, consult. engrs., 407 Danciger Bldg., Fort Worth, earthen dam on Palo Dura River. **$4,000,000.**

▲ **W. Va., Weirton**—City, City Hall, water sys. expansion, imprv. **$1,500,000.**

SEWERS, WASTE DISPOSAL

▲ **N. J., Carneys Point**—Upper Penns Neck Sewerage Auth., 118 C St., sewerage sys. to serve Carneys Point, Ordmont, Golf Manor, Golfview, Ives Ave., Regional and Dixie Drs., Proj. No. P-NJ-3087, **$1,610,000,** to go ahead in 1961. Bogert & Childs, 145 E. 32 St., New York, N. Y., consult. engrs. CD 4/9.

▲ **N. Y., New York**—Dpt. P. Wks., Municipal Bldg., Zone 7, Proj. PW-56 extension of Hunts Point Pollution Control Proj., to incl. sewage pumping, blower and power generating capacity, new grit handling equipment, conversion of existing sludge digestion tanks, sludge thickening tanks, expansion of aeration tanks and final settling tanks, chlorination facilities, etc., and alterations to existing structures as required to serve expanded plant, etc., Bronx 8boro. **$5,500,000.** Malcolm Pirnie Engineers, 25 W. 43rd St., New York 36, N. Y., and Lockwood, Kessler & Bartlett, Inc., One Aerial Way, Syosset, N. Y., engrs. To go ahead after 1960. CD 3/22/43.

▲ **N. C., Albemarle**—City, City Hall, sewage treatment plant. **$2,000,000.** Pierson & Whitman, 1618 Glenwood Ave., Raleigh, consult. engrs. CD 2/8.

▲ **Tex., Denton**—City, City Hall, voted bonds Jan. 30, sanitary sewerage sys. col. lines, **$1,650,000;** sewage disposal plant unit, **$200,000;** sanitary sewerage sys. rehabilitation, **$125,000.** CD 1/25.

▲ **Va., Chesterfield**—Bd. Supervs. Chesterfield Co. defeated bonds Feb. 2, sewerage system. **$11,775,000.** R. Stuart Royer & Assocs., 15 W. Cary, Richmond, consult. engrs. CD 12/24.

BRIDGES

▲ **RHODE ISLAND**—State R. I. & Prov. Plants, Div. Purchase, State House, Providence,
Newport Co.—bridge over east passage Narragansett Bay,

(Continued on page 88)

CYANAMID'S EXPLOSIVES ENGINEER HELPS YOU ON THE JOB!

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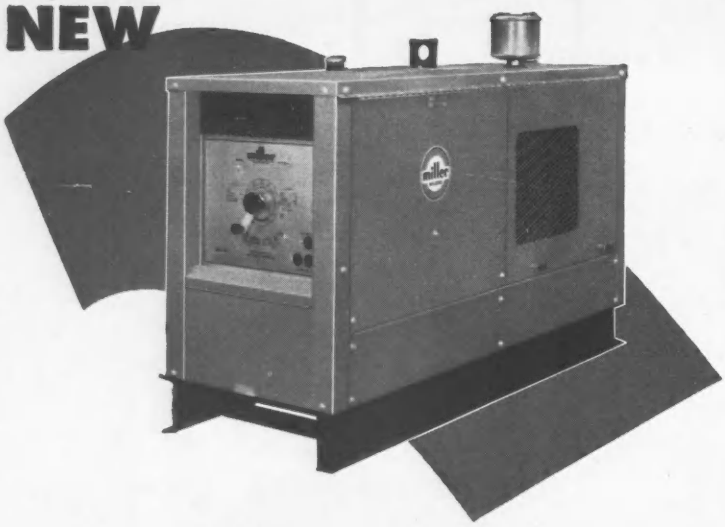

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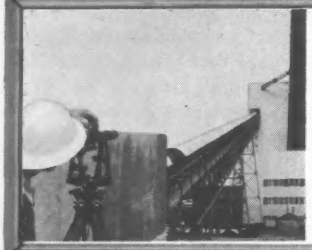

BERGER 6¼" Bronze Transit points the way for **STONE & WEBSTER**

C. L. BERGER & SONS, INC.
45 Williams St., Boston 19, Massachusetts

(Continued from page 86)

between Newport and Jamestown, **$36,000,000.** Parsons, Brinckerhoff, Quade & Douglas, 165 Broadway, New York 6, N. Y., consult. engrs. CD 8/17/50.

STREETS AND ROADS

▲ **CONNECTICUT**—State Hy. Dpt., 24 Wolcott Hill Rd., Wethersfield,
Bolton and Manchester—relocation U.S. Rte. 6, from Spencer St., Manchester to Bolton Notch, Bolton, 7.2 mi., 4 lanes, Manchester, 21 lanes, Bolton. **$11,000,000.**

▲ **MICHIGAN**—State Hy. Dpt., Mason Bldg., Lansing,
Manistee Co.—wid'n., imprv. 18 mi. US 31 from M-22 to north county line. **$1,159,000.** Bids in June.

▲ **NEW YORK**—Dpt. P. Wks., State Office Bldg., Albany,
St. Lawrence Co.—reconstr. 10 mi. Rte. 58 from point about 1 mi. west of Village of Edwards, southeastward to Rte. 3 near Fine, FAI Project. **$2,000,000.**

▲ **OHIO**—State Hy. Dpt., State Depts. Bldg., Columbus, Zone 15,
Summit and Stark Counties—14.9 mi. Interstate Rte. 77, connecting Akron and Canton. **$12,514,148.** Michael Baker, Jr., Inc., Rochester, Pa., consult. engr.

▲ **PENNSYLVANIA**—Pa. Hys. Dept., 506 North Office Bldg., Harrisburg,
Cumberland and Franklin Counties—about 50 mi. Cumberland Valley Freeway (Interstate) between Middlesx, Carlisle and Maryland State Line north of Hagerstown, **$40,000,000.**
Lackawanna, Wayne and Pike Counties—about 48 mi. 4-lane divided highway (Interstate) between Elmhurst, Lackawanna Co. and Matamoras Pike Co., **$47,000,000.**
Lackawanna and Monroe Counties—about 45 mi. 4-lane divided hy. (Interstate) between Dunmore Lackawanna Co. and Stroudsburg, Monroe Co. **$42,000,000,** W. R. B. Froehlich, c/o owner, acting ch. engr.

▲ **Tex., Denton**—City, City Hall, voted bonds Jan. 30, streets paving, **$1,750,000;** reworking, imprvs. old streets, **$650,000.** CD 1/25.

▲ **Va., Lynchburg**—Dpt. P. Wks., City Hall, constr. Crosstown Rd. connecting Langhorne Rd. with Ribvermont Ave. **$1,000,000.** Wiley & Wilson, Courtland Bldg., consult. engrs. CD 12/3/59.

▲ **Wash., Seattle**—City, County-City Bldg., paving streets in area bounded by 9 and 20 Aves. S.W., W. Webster and Roxbury Sts., north of White Center. **$2,314,527.** R. W. Morse, c/o owner, city engr.

EARTHWORK, WATERWAYS

▲ **Pennsylvania**—Dpt. Forests & Waters, Education Bldg., Harrisburg, flood control reservoir dam for Standing Stone Creek, Huntingdon, Co., **$1,975,000;** flood control project improve channels and erect barriers, Frankstown Branch of Juniata River, Blair Co., **$660,000.** B. D. Murphy, c/o owner, ch. engr. CD 10/2.

▲ **Manitoba**—Manitoba Hydro Electric Bd., 650 Harrow Ave., Winnipeg, 328,000 kw. hydro electric plant, Grand Rapids, **$140,000,000.** CD 12/7/56.

AIRPORTS

▲† **Ala., Huntsville**—SATURN STATIC TEST FACILITY—National Aeronautics & Space Admin., Huntsville Facility, saturn static test facility **$7,000,000** (no appropriation) central laboratory and office facility **$4,400,000** (no appropriation); extension to assembly bldg. **$2,500,000** (no appropriation); engineering bldg. addn. **$1,137,000** (no appropriation); completion of guidance and control bldg. **$1,948,000** (no appropriation); pressure test cell **$650,000** (no appropriation); dynamic test facility **$600,000** (no appropriation); factication laboratory addn. **$215,000** (no appropriation).

▲† **Alaska, Anchorage**—LONG RANGE RADAR—Federal Aviation Agency, Region 5, P.O. Box 440, Anchorage, long range radar, **$2,409,300.**

▲† **Alaska, Fairbanks**—LONG RANGE RADAR—Federal Aviation Agency, Region 5, P.O. Box 440, Anchorage, long range radar, **$2,409,300.**

▲† **Calif., Red Bluff**—LONG RANGE RADAR—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, long range radar, **$2,409,300.**

▲† **Fla., Cocoa**—SATURN LAUNCHING COMPLEX, etc.—National Aeronautics & Space Admin., Atlantic Missile Range, Cape Canaveral, completion Saturn Launching Complex, **$2,250,000,** no appropriation; engineering and laboratory addn., **$300,000,** no appropriation.

▲† **Ill., Chicago**—TRAFFIC CONTROL CENTER BLDG.—Federal Aviation Agency, Region 3, 4825 Troost Ave., Kansas City, Mo., air route traffic control center bldg., **$1,700,000.**

▲† **Iowa, Iowa City**—LONG RANGE RADAR—Federal Aviation Agency, Region 3, 4825 Troost Ave., Kansas City, Mo., long range radar, **$2,409,300.**

▲ **Mass., East Boston**—HANGAR, etc.—Commonwealth of Mass., Port Auth., 14 Court Sq., Boston, plans by W. Chester Browne & Assoc., 122 Arlington St., Boston, L-58-2, Contr. 3, hangar leanto facilities and aprons, Logan Airport. **$3,000,000.** Trans World Airlines, Inc., 480 Boylston St., Boston, lessee. Bids in March. CD 5/20.

▲† **Minn., Minneapolis**—AIR ROUTE TRAFFIC CONTROL CENTER—Federal Aviation Agency, Region 3, 4825 Troost Ave., Kansas City, Mo., air route traffic control center, **$1,700,000.**

▲† **Mo., Kansas City**—AIR ROUTE TRAFFIC CONTROL CENTER, etc.—Federal Aviation Agency, Region 3, 4825 Troost Ave., Kansas City, Mo., air route traffic control center, **$1,700,000;** airport traffic control tower, **$168,400.**

(Continued on page 92)

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U. S. Highway 23 Interchange, west of
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General Contractor: Walter Toebe & Co.
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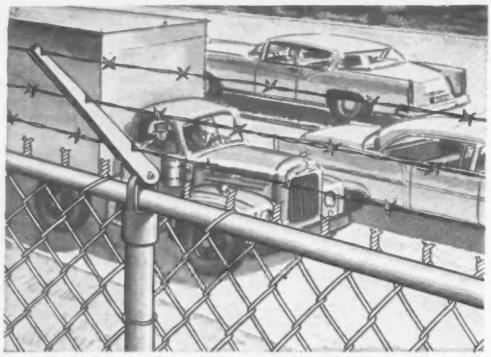

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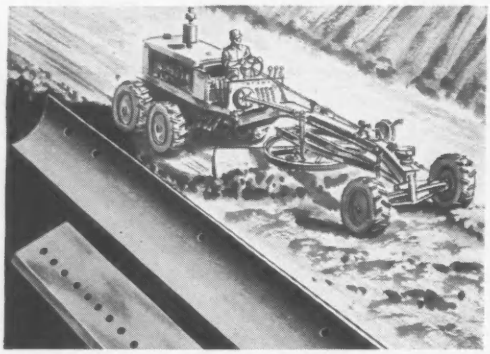

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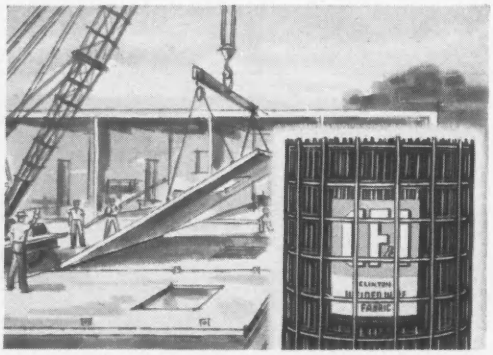

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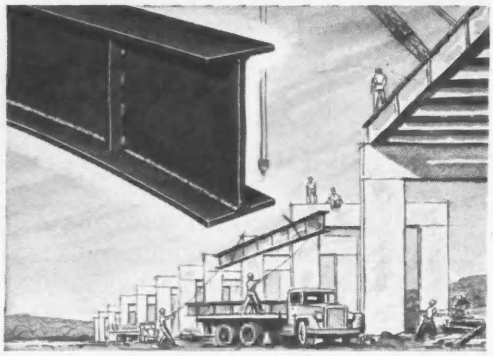

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(Continued from page 88)

▲† **Neb., North Platte**—LONG RANGE RADAR—Federal Aviation Agency, Region 3, 4825 Troost Ave., Kansas City, Mo., long range radar. **$2,409,300.**

▲† **Nev., Elko**—LONG RANGE RADAR—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, Calif., long range radar. **$2,409,300.**

▲† **N. M., Albuquerque**—TRAFFIC CONTROL CENTER BLDG.—Federal Aviation Agency, Region 4, 5651 W. Manchester Ave., Los Angeles, Calif., air route traffic control center bldg. **$1,700,000.**

▲ **Tenn., Knoxville**—RUNWAY, etc.—City, City Hall, extend jet runway 2,500 ft. and add lights plus wing extension on administration building, **$1,100,000.** W. L. Montgomery, Daylight Bldg., Knoxville, consult. engr. CD 1/4/57.

▲† **Tenn., Memphis**—AIR ROUTE TRAFFIC CONTROL CENTER BLDG.—Federal Aviation Agency, Region 2, P.O. Box 1689, Fort Worth, Tex., Air Route Traffic Control Center Bldg. **$1,700,000.** CD 9/11/58.

▲† **Utah, Brigham City**—MISSILE PLANT—Ballistic Missile Div. of Air Research & Development Command, 5740 Arbor Vitae St., Inglewood, Calif., plant for production of Minuteman Intercontinental Ballistic Missiles. **$34,000,000.** Thiokol Chemical Co., Utah Div., 64 North Main St., Brigham City, Utah, will operate.

▲† **Utah, Milford**—LONG RANGE RADAR—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, Calif., long range radar. **$2,409,300.**

▲† **Utah, Ogden**—MISSILE PLANT—Ballistic Missile Div. of Air Research & Development Command, 5740 Arbor Vitae St., Inglewood, Calif., rehabilitation of Ordnance Plant No. 77 near Hill Air Force Base for assembly plant for Minuteman ICBM missiles. **$11,000,000.** Boeing Aircraft Co., 7755 E. Marginal St., Seattle, Wash., will operate.

▲† **Va., Hampton**—LABORATORY, DYNAMCA FACILITY—National Aeronautics & Space Admin., Langley Research Center, dynamics research laboratory, **$4,000,000,** no appropriation; hypersonic aerothermal dynamics facility, **$7,959,000,** no appropriation.

▲† **Wash., Seattle**—TRAFFIC CONTROL CENTER BLDG.—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, Calif., air route traffic control center bldg. **$1,700,000.**

LATIN AMERICA

▲ **Mexico, Mexico City**—WAREHOUSE—Sears Roebuck & Co., 925 S. Homan St., Chicago, Ill., warehouse. **$1,000,000.**

▲† **Wyo., Rock Springs**—LONG RANGE RADAR—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, Calif., long range radar. **$2,409,300.**

▲† **Wyo., Wheatland**—LONG RANGE RADAR—Federal Aviation Agency, Region 4, 5651 Manchester Ave., Los Angeles, Calif., long range radar. **$2,409,300.**

PUERTO RICO

▲ **Puerto Rico, San Juan**—APARTMENT—Rodriguez, Ramirez & Diaz Gonzalez, 1556 Ponce de Leon, San Juan, plans by Horacion Diaz & Assoc., 844 Hostos St., 20 story 80-unit Condominium Atlantico apartment. **$1,200,000.**

FOREIGN

▲ **British West Indies, Bahamas**—HOUSING DEVELOPMENT—South Shore Development Co. Ltd., c/o Robert M. Little, archt., 2180 Brickell Ave., Miami, Fla., U.S.A., and Melich & Robjohns, Nassau, housing development on Island of New Providence. **$2,000,000.**

▲ **Jordan, Amman**—FACTORY—Jordan Cement Factories Co., P.O. Box 610, Amman, factory addn. **$1,000,000.**

▲ **Netherlands, Rotterdam**—PLANT—Dow Chemical Co., Midland, Mich., U. S. A., plant for production of styrene-butadiene latex. **$2,000,000.**

U. S. POSSESSIONS

▲† **Canal Zone, Balboa**—AIR ROUTE TRAFFIC CONTROL CENTER—Federal Aviation Agency, Region 2, P. O. Box 168, Fort Worth, Tex., U. S. A., air route traffic control center. **$1,700,000.**

▲ **Turkey**—Ministry of Public Works, Govt. Turkey, Ankara.

high bridge over Bosporus at Istanbul. **$50,000,000.** Bidders must pre-qualify before May 16. Steinman, Boynton, Gronquist & London, 117 Liberty St., New York 6, N. Y., engrs. CD 11/21/57.

PUBLIC BUILDINGS

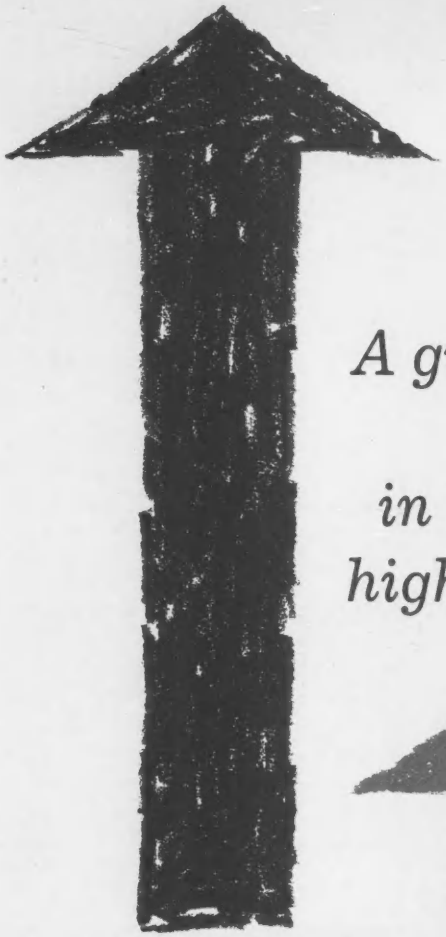
▲ **Colo., Denver**—MUSEUM—State of Colorado, State Planning Div., State Capitol, historical museum. **$1,000,000.**

▲ **Conn., Coventry**—HIGH SCHOOL—Town, Town Hall, plans by Russell, Gibson & Von Dohlen, 1009 Farmington Ave., West Hartford, Junior-Senior High School, **$1,375,000.** Jerome F. Mueller, 15 Lewis St., Hartford, consult. engr. Burton & Von Houten, 993 Farmington Ave., West Hartford, mech.-engrs. CD 11/20.

▲ **Conn., Meriden**—INSTITUTE—State P. Wks. Dpt., 165 Capitol Ave., Hartford, plans by Walter Crabtree, Jr., 195 Fern St., West Hartford, 2 story, Horace Wilcox Regional Technical Institute, Oregon Rd. **$2,833,000.** John P. Legnos, 30 Gillett St., Hartford, consult. engr. Wilcox & Erickson, 11 E. 44 St., New York, N. Y., structural engrs. CD 11/19/58.

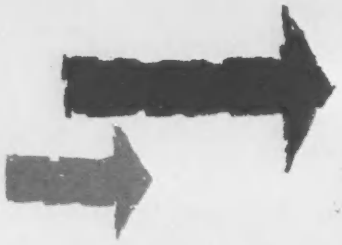
(Continued on page 97)

"DEEP-STRENGTH" ASPHALT CONSTRUCTION



A giant step forward in basic highway design . . .

Presented for your consideration by officers, engineers and members of **THE ASPHALT INSTITUTE**
Asphalt Institute Bldg., College Park, Md.



"DEEP-STRENGTH"
ASPHALT CONSTRUCTION

- Lowers stresses on subgrade
- Reduces total pavement structure thickness
- Makes many lower-quality aggregates usable
- Is not susceptible to frost damage
- Protects subbase from rain during construction
- Permits haul traffic on base without damage
- Eliminates subsurface moisture build-up
- Aids uniformity of pavement
- Does away with shoulder erosion
- Minimizes slope erosion
- Furnishes better drainage
- Prevents wheel-track rutting
- Provides for stage construction
- Improves surface riding qualities
- Increases driving and parking safety

THE ASPHALT INSTITUTE
COLLEGE PARK, MARYLAND

SUMMARY OF

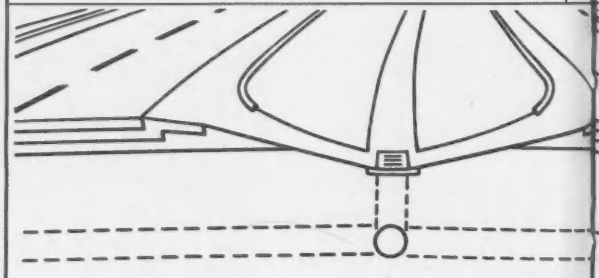
ADVANCED DESIGN CRITERIA

FOR "DEEP-STRENGTH" ASPHALT PAVEMENTS

I Recommended pavement design
  a. Use of Asphalt base
  b. Use of Asphalt prime coat and tack coats
  c. New thickness minimums (see Table I)

II Controlled heavy compaction (see Table II)

III Full-width drainage (see Typical Cross Section)



The new Advanced Design Criteria recommend better surface and subsurface drainage. For better **surface** drainage full-width paving is recommended. On elevated grades the water should be directed to Asphalt spillways by means of Asphalt dykes or curbs constructed on the extreme outside edge of the shoulder. For better **subsurface** drain-

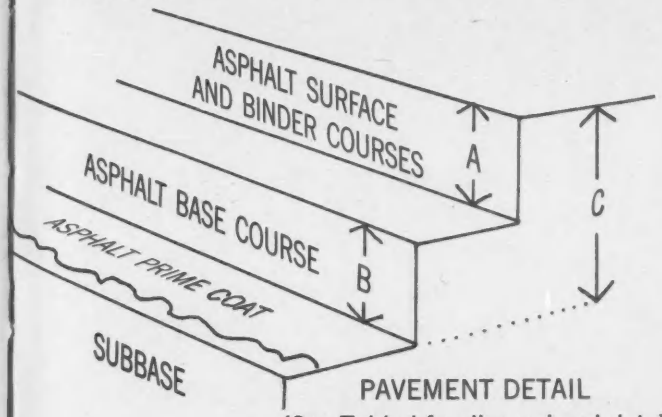
"The increasing stresses now being imposed on pavements by modern heavy traffic with average tire contact pressures as high as 100 psi or more, and the anticipated future increase in wheel coverages indicate that general improvements in pavement design and construction must be made. To meet this need, The Asphalt Institute calls to the attention of highway designers the Advanced Design

TABLE I
RECOMMENDED MINIMUM THICKNESSES OF SURFACE-PLUS-BINDER AND OF BASE COURSES (inches)*

TRAFFIC	A**	B w/Asph base	B w/o Asph base	C w/Asph base	C w/o Asph base
Very Hvy	4	4	6	8	10
Heavy	3	3½	5	6½	8
Medium	3	2	3	5	6
Light	2	2	3	4	5

*For thickness of subbase and improved subgrade courses, see Asphalt Institute Manual Series No. 1.

**May be reduced by substitution of Asphalt base of comparable strength on inch-for-inch basis.



PAVEMENT DETAIL
(See Table I for dimensional data)

TABLE II
RECOMMENDED MINIMUM COMPACTION CRITERIA*
(summary)

NON-ASPHALT COURSES

COURSE	MINIMUM (% modified AASHO Density)
SUBGRADES (layers not to exceed 6 inches)	
Cohesive	95%; top 12 inches 90%; balance of fill (When optimum moisture is near plastic limit, compact at moisture content approximately 1% below theoretical optimum)
Cohesionless	100%; top 12 inches 95%; balance of fill
BASES, SUBBASES AND IMPROVED SUBGRADES (layers not to exceed 6 inches)	
All	Compaction load and contact pressures as high as material will support without undue rutting or displacement

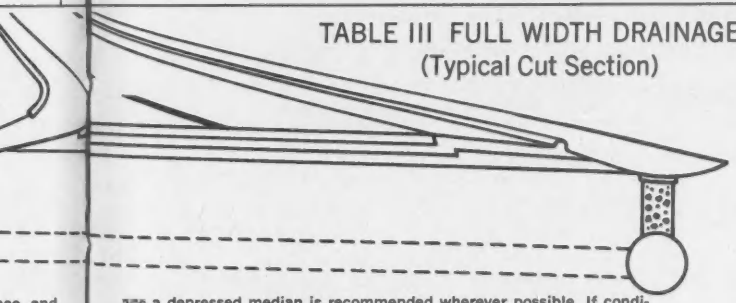
(proof roll with heavy rubber-tired rollers)

ASPHALT COURSES
(base, binder, surface)

COURSE	MINIMUM CRITERIA
SUPPORTING COURSES	Flat steel-wheel rollers to be supplemented with pneumatic tire rollers having average tire contact pressures of 85-110 p.s.i.
SURFACE COURSES	Same as for Supporting Courses

*For detailed information see The Asphalt Handbook, Manual Series No. 4.

TABLE III FULL WIDTH DRAINAGE
(Typical Cut Section)



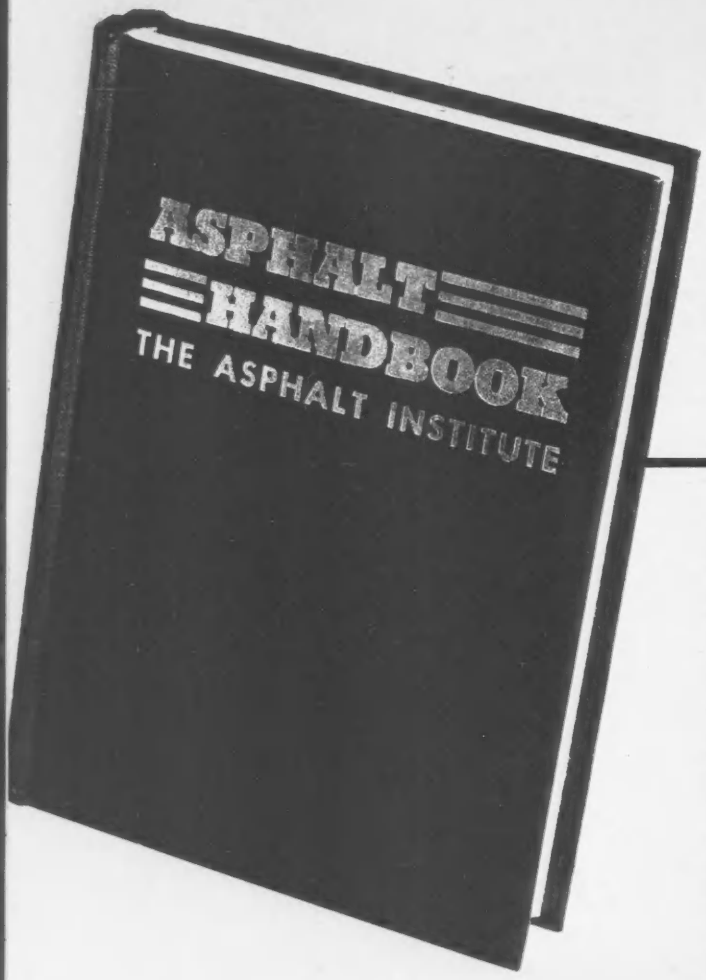
age a depressed median is recommended wherever possible. If conditions make it mandatory to construct an elevated median, transverse drains should be connected with a longitudinal drain in the median deep enough to collect all ground water before it can find its way into the pavement structure.

THE ASPHALT INSTITUTE
COLLEGE PARK, MARYLAND

PROJ. I-205 DEEP-STRENGTH ASPHALT SHEET		DATE
KT/LE	APP. A. W.	JAN. 1, 1960

Criteria given in broad detail above and designated, DEEP-STRENGTH Asphalt pavements." The Institute strongly recommends the adoption of these Advanced Design Criteria in the construction of all future heavy-duty Asphalt pavements. For detailed data, you are urged to contact The Asphalt Institute District Engineer in your area. *(see list on page 4)*

Irwin S. Wellborn
CHIEF ENGINEER



NEW HANDBOOK

Now on the presses is a new edition of THE ASPHALT HANDBOOK. It incorporates all the Advanced Design Criteria for highways implied by the term DEEP-STRENGTH Asphalt Construction. It also includes the latest design and research data concerning other major uses of Asphalt . . . for ditch linings, embankment facings, etc. Copies will soon be available at The Asphalt Institute office serving your area.

ENGINEERING AID

The Asphalt Institute has District Engineering offices in the following locations. Call on your District Engineer to discuss your Asphalt problems at any time.

DIVISION I—ATLANTIC-GULF

NEW YORK 20, N. Y., 1270 Avenue of the Americas
BOSTON 16, MASS., 419 Boylston Street
ALBANY 7, N. Y., 11 North Pearl Street
HARRISBURG, PA., 800 North Second Street
RICHMOND 19, VA., Travelers Building
ATLANTA 9, GEORGIA, 881 Peachtree Street, N. E.
MONTGOMERY 4, ALA., 79 Commerce Street
NEW ORLEANS 18, LA., Maison Blanche Building

DIVISION II—OHIO VALLEY-GREAT LAKES

COLUMBUS 15, OHIO, Neil House
LANSING 16, MICH., 109 West Michigan Avenue
LOUISVILLE 7, KENTUCKY, 4050 Westport Road

DIVISION III—MIDWEST

ST. PAUL 4, MINN., 1951 University Avenue
CHICAGO 39, ILL., 6261 West Grand Avenue
SPRINGFIELD, ILL., 2606½ South Sixth Street
KANSAS CITY 3, KANSAS, 2500 Johnson Drive
DENVER 2, COLORADO, 1031 15th Street
PIERRE, SO. DAKOTA, 104 S. Euclid Avenue
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OKLAHOMA CITY 2, OKLA., Republic Building
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Ribbons of velvet smoothness . . .
ASPHALT-paved Interstate Highways

DEEP-STRENGTH

THE ASPHALT INSTITUTE
Executive Offices and Laboratories
Asphalt Institute Building, College Park, Md.

(continued from page 92)

▲† **Conn., New London**—RESEARCH—Dist. P. Wks. Office, Third Naval Dist., Federal Office Bldg., 90 Church St., New York 7, N. Y., plans by Douglas Orr, 111 Whitney Ave., New Haven, anti-submarine research bldg., Underwater Sound Laboratory, Fort Trumbull, $4,432,000; dental bldg., $300,000. CD 1/25/57.

▲ **Hawaii, Honolulu**—WAR MEMORIAL AUDITORIUM—City, City Hall, plans by Merrill, Simms & Roehrig, Damon Bldg., war memorial auditorium. $5,000,000.

▲ **Ill., Chicago**—TRANSIT BUS OVERHAUL SHOP, etc.—Chicago Transit Authority, Merchandise Mart, Zone 54, transit bus overhaul shop, 77th and Vincennes Ave., $4,000,000, Bids in September; rapid transit inspection shop, Forest Park, $950,000, Bids in April.

▲ **Kan., Kansas City**—LIBRARY, etc.—Bd. Educ., Library Bldg., Kansas City, Kan., preliminary studies by Jos. Radotinsky, 1401 Fairfax Trafficway, Kansas City, Kan., public library and school administration office. $1,600,000. CD 5/13/58.

▲ **La., Shreveport**—SCHOOL—Caddo Parish School Bd. plans by Walker & Walker, Slattery Bldg., Junior-Senior High School, 20 acre site on Henry St. $1,000,000. Francis Grant, Ricou-Brewster Bldg., structural engrs. Rottman-Harris-Jambor, 906 Market St., mechanical-electrical engrs. CD 1/20.

▲ **Me., Gorham**—BOYS' TRAINING CENTER—State, Dpt. P. Imprvts., State House, Auburn, preliminary plans by Walsh Engineering, Inc., archt.-engr., 169 Front St., South Portland, Me., Boys' Training Center, $7,211,000.

▲† **Md., Beltsville** — PAYLOAD TESTING FACILITY, etc.—National Aeronautics & Space Admin., Goddard Space Flight Center, Beltsville, payload testing facility, $3,555,000 (no appropriation); satellite sys. laboratory, $4,636,000 (no appropriation); utility installations, $1,309,000 (no appropriation), Goddard Space Flight Center. CD 3/11/59.

▲ **Md., Catonsville**—INFIRMARY—State, Dpt. P. Imprvts., 506 Park Ave., Baltimore, Zone 1, plans by Booth & Sommers, Salisbury, brick, steel, concrete infirmary, Spring Grove Mental State Hospital. $1,200,000. Bids this fall. CD 12/23.

▲ **Minn., White Bear Lake**—SCHOOL—Bd. Educ. Independent School Dist. No. 624, voted $1,200,000 bonds Dec. 8, elementary school. Haarstick-Lundgren & Assocs., N-212 First Natl. Bank Bldg., St. Paul, archts. (**Correction**—status). CD 12/15.

▲ **Mo., North Kansas City**—SCHOOLS—Bd. Educ., 2000 E. 46th St. North, voted $3,300,000 bonds Feb. 2 for schools, Marshall & Brown, 1016 Baltimore, Kansas City, Mo., archts. for Junior High School; Curtis & Cowling, 406 E. 62nd, Kansas City, Mo., archts. for high school addn. Herman A. Scharhag, 1806 Swift, North Kansas City, Mo., archts. for Gracemor Elementary School. Edw. M. Fuller, 701 E. 14th, North Kansas City, Mo., archts. for Sunset Hill Elementary School. McCall & Watson, 1021 McGee, Kansas City, Mo., archts. for Meadowbrook North Elementary School. CD 10/13.

▲ **Neb., Scottsbluff**—HIGH SCHOOL—Bd. Educ. plans by Clark & Emerson, 415-18 Sharp Bldg., Lincoln, high school. $1,700,000. CD 3/20/57.

▲ **N. C., Charlotte**—LONG RANGE RADAR—Federal Aviation Agency, Region 2, P. O. Box 1689, Fort Worth, Tex., long range radar, $2,409,300.

▲ **N. C., New Bern**—HOSPITAL—Bd. Comrs. Craven Co., Courthouse, plans by Raymond Fuson, Elks Temple Bldg., 100-bed hospital, $2,000,000. J. N. Pease & Co., Inc., 119½ E. 5th St., Charlotte, assoc. archts.

▲ **N. C., Raleigh**—HIGH SCHOOL—City School Bd., City Hall, high school, Longview Heights. $1,600,000. CD 12/17.

▲† **O., Cleveland**—ENERGY CONVERSION LABORATORY—National Aeronautics & Space Admin., Lewis Research Center, 21000 Brookpark St., energy conversion laboratory, $5,050,000 (no appropriation); basic materials research laboratory, $4,050,000 (no appropriation).

▲† **Okla., Bartlesville**—PHYSICAL SCIENCE, etc.—Bureau of Mines, c/o Dpt. Interior, Wash., D. C., plans by Donald McCormick, 1645 E. 21st St., Tulsa, physical science, central heating, refrigeration bldg. Bureau of Mines, $2,185,000 (no appropriation).

▲ **Pa., Phila.**—POLICE ADMINISTRATION—Dpt. Procurement, City Hall Annex, plans by Becker & Qualls, 258 S. Van Pelt St., police admin. bldg., 7 and Race Sts. $4,500,000. David Bloom, 1411 Walnut St., consult. engr. CD 3/12/58.

▲ **Tex., Electra**—SCHOOL—Electra Ind. School Dist., Electra, school, 9 acres south of Hillcrest addn. $1,350,000.

▲ **Tex., Wharton** — SCHOOLS — Wharton Ind. School Dist., High School, 24-acre tract NE section, $1,250,000; plans by Reber, Davidson & Kelling, Wharton, elementary school, $400,000.

▲ **Va., Hampton**—SCHOOL—City, School Bd., Hampton, Senior High School. $1,550,000.

▲ **Va., Princess Anne**—SCHOOLS—Princess Anne Co. School Bd., 2 high schools, 3 elementary schools, $5,500,000. CD 7/13/56.

▲ **Va., Richmond**—REGIONAL JAIL—State of Va., Dpt. Welfare & Institutions, State Office Bldg., Regional jail, $1,262,000.

▲ **W. Va., Morgantown**—DWELLING UNITS—West Virginia Bd. Governors, plans by C. E. Silling & Assocs., Masonic Bldg., Charleston, and Alex Mahood, P. O. Box 668, Bluefield, apartment type dwelling units, Medical Campus and housing, Main Campus, Uni-

New Optical Plummet Built into Gurley Transit Saves Set-up Time, Improves Accuracy on Windy Days

Years ago, Gurley introduced lightweight instruments to combat wind vibrations. Now Gurley further beats the wind problem with an optical plummet *built into* the instrument.

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Troy, N. Y.

versity at Morgantown, $4,500,000. Tentative bid Mar. 22.

▲ **Alta., Calgary**—HIGH SCHOOL—Calgary Pub. School Bd., 4th Ave. and 6th St. W., plans by J. Stevenson & Assocs., 344 12th Ave. W., high school, Elbow Dr. and 75th Ave. S.W., $2,750,000.

▲ **Sask., Yorkton**—HOSPITAL—Dpt. P. Wks., Parliament Bldgs., Regina, plans by Izumi, Arnott & Sugiyame, 2151 Albert St., Regina, masonry, steel Mental Hospital, central administration bldg., 2 story, treatment bldg., 4 cottages, $1,000,000. CD 2/5, under Yorkton Hospital as owners.

COMMERCIAL BUILDINGS

▲ **Calif., Sacramento**—DEPARTMENT STORE— Broadway-Hales Department Store, 9th and K Sts., plans by Charles Luckman Assocs., 9220 Sunset, Los Angeles, 185,000 sq. ft. department store, incl. 7,500 car parking in Arden Fair Shopping Center, near here. $4,000.000 Constr. for fall. CD 6/2/58.

▲ **Conn., Danbury**—HOUSES—Wiedl Realty, Inc., Bethel, 111 houses, "Kingswood" Ball Pond, $1,110,000.

▲ **Conn., Hamden**—THEATRE, HOTEL, etc.—Joseph P. Vetrano, 76 Willox St., Bristol, theatre, hotel, restaurant, convention hall, skating rink, Meadowbrook Country Club Property, $6,000,000.

▲ **Ill., Chicago**—COLLEGE LIBRARY—Illinois Institute of Technology, 3300 S. Federal St., plans by Skidmore, Owings & Merrill, 30 W. Monroe St., Zone 3, college library. $1,000,000. Bids in 1960.

▲ **Ill., Northlake**—HOME FOR AGED—Villa Scalabrini, Wolf Rd., plans by Frank Serpico, 4800 N. Milwaukee Ave., Chicago, 4 wing home for aged addn. $1,500,000.

▲ **La., New Orleans**—SHOPPING CENTER—Interchange Realty Co., 2110 American Bank Bldg., plans by Curtis & Davis, 2475 Canal St., New Orleans, La., 1, 2 and 3 story 413,600 sq. ft. shopping center, west bank of Mississippi River. $7,500,000.

▲ **Mich., Monroe**—HOSPITAL—Monroe General Hospital, plans by Lewis J. Sarvis, 258 Champion St., Battle Creek, hospital. $2,000,000. CD 8/13.

▲ **Minn., Mendota Heights (P. O. St. Paul)**—CLASSROOM, etc.—Archdiocese of St. Paul, 244 Dayton Ave., St. Paul, classroom bldg., library, gymnasium, science wing, student residence, etc., Rogers Lake for St. Thomas Academy. $1,750,000. To go ahead 1961-1962.

▲ **Minn., Minneapolis**—HOTEL, etc.—Mark Twain Properties, Inc., 1023 Marquette Ave., plans by W. Thorsen, 1009 Marquette Ave., 12 story, 250 unit hotel, 1 story, 70 unit motel, swimming pool, 10th and 11th Sts. and Marquette Ave. and 2nd Ave. S. $3,400,000. Constr. 1960 or 1961. CD 1/26.

▲ **Minn., Roseville (P. O. St. Paul)**—SHOPPING CENTER—H. J. Slawik Properties, Inc., 2388 University Ave., plans by W. Thorsen, 1009 Marquette Ave., Minneapolis, 223,000 sq. ft. Snelling Plaza shopping center, Skillman St. and Snelling Ave. North. $3,000,000. CD 6/5.

▲ **N. J., Long Branch** — HOSPITAL-HOME — Home for Chronic Sick, 81 Washington St., plans by George Levy, 1147 E. Jersey St., Elizabeth, hospital-home addn. $1,000,000.

▲ **N. J., Newark**—HOSPITAL—Diocese of Newark, Mulberry St., plans by Schmidt, Garden & Erickson, 104 South Michigan Ave., Chicago 3, Ill., addn. to St. Michael's Hospital, 306 High St. $10,000,000.

▲ **N. J., Trenton**—REHABILITATION CENTER—Delaware Valley Rehabilitation Center, 230 Hamilton Ave., plans by Hankin, Stull & Backes, 495 W. Hanover St., 1 story rehabilitation center, Lower Ferry Rd. $1,000,000.

▲ **N. Y., Newburgh**—LIBERAL ARTS COLLEGE—Dominican Sisters of Mount St. Mary, Liberty St., Liberal Arts College to be called Mt. St. Mary's College: academic bldg., 3 story novitiate and juniorate bldg. $3,000,000.

▲ **N. Y., New Hyde Park**—HOSPITAL, etc.—Long Island Jewish Hospital, 270-05 76th Ave., addnl. 4 to 5 story hospital, and wing for psychiatric patients and wing for physical rehabilitation. $6,000,000. Fund raising program under way.

▲ **N. Y., New York**—HOUSING—Empire City Savings Bank, 2 Park Ave., Zone 16, will not construct 18 story, 180 unit Empire City Housing, on blockfront on west side of Manhattan Ave. from West 122nd to West 123d Sts. $2,000,000. Project abandoned. CD 1/27.

▲ **N. Y., New York**—OFFICE—Harry Horwitz & Milton Barkin, 565 5th Ave., Zone 17, will not construct 26 story office, northeast corner 3rd Ave. and E. 48th St. $3,000,000. Project abandoned. CD 10/16.

▲ **N. Y., New York**—TELEPHONE EXCHANGE IMPRVS.—New York Telephone Co., 140 West St., Zone 7, plans by Voorhees, Walker, Smith, Smith & Haines, 101 Park Ave., Zone 17, telephone exchange alterations, 208-16 E. 79th St. $1,300,000.

▲ **O., Columbus**—APARTMENT—Tibbals, Crumley & Musson, 965 E. Broad St., plans by Noverre Musson, 965 E. Broad St., 11 story, L shaped apartment, two story underground parking, E. Broad and 22nd Sts. $2,000,000.

▲ **O., Dayton**—MOTOR COURT, etc.—Owner, c/o Alfred I. Soltz, Leader Bldg., Cleveland, Zone 14, 100 unit Howard Johnson motor court, swimming pool, north of here. $1,000,000.

▲ **O., Oberlin**—HOMES—G. H. Glover, Royal Oak, Mich., c/o Laundon & Huffman, civil engrs., 146 Middle St., Elyria, 264 homes, Willowbrook Farms Subdivision, $4,000,000.

▲ **O., University Heights**—LIBRARY—John Carroll University plans by Charles Bacon Rowley & Assocs., Inc., and Ernst Payer, Keith Bldg., Cleveland, library, $1,500,000. Bids soon.

▲ **Pa., Enola** — RESIDENTIAL DEVELOPMENT — Sgrignola Bros., Mounted Route, 300 home residential development, Magaro Rd., West Enola, East Pennsboro Twp. $4,000,000.

▲ **Pa., Paoli**—APARTMENTS—Great Valley Builders, Inc., att. Wallace J. Mahoney, Towers Apartments, off Rte. 202, $1,000,000.

▲ **Tex., Corpus Christi** — OFFICE, etc. — (Syndicate) L. L. Gragg & Associates, c/o Jones Bldg., 16 story office, $5,000,000; 660-room Resort Hotel, $10,000,000; earthen fill development area for bldgs., $2,090,000; area and auto center hard pavement, $250,000; area lighting sys., $100,000; water-sewer-gas lines up to and in development area, $150,000, Corpus Christi Bay.

▲ **Tex., Fort Worth**—APARTMENTS—Progressive Development, Inc., 3500 Denton Hy., plans by Frank McLure & Assocs, 316 Bailey, 1 story, 150-unit garden type apartments, adjoining North Hills Village Shopping Center, Over $1,000,000.

▲ **Tex., Greggton**—SHOPING CENTER, etc.—Frank L. LeBus, Sr., Longview, shopping center, $1,000,000; hard-paved area and auto center, $95,000; site area grading, filling, leveling, etc., $60,000, off Hy. 80.

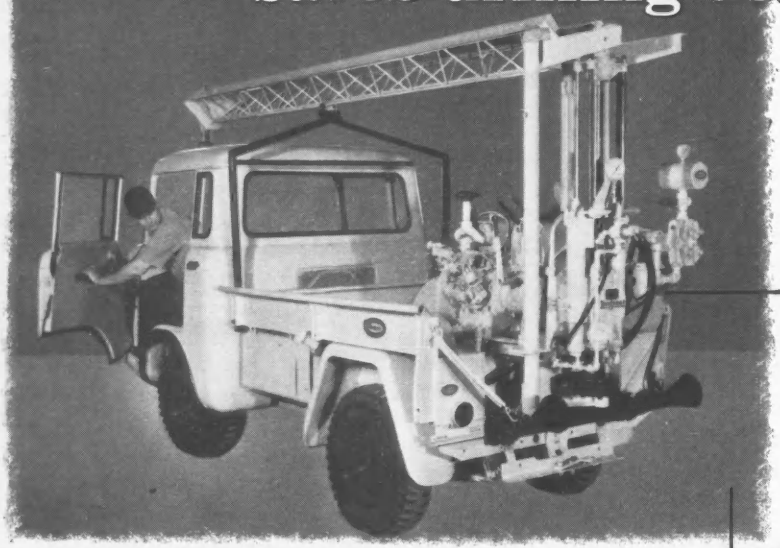
▲ **Tex., Houston**—CHURCH—Memorial Baptist Temple, c/o Smart & Whitehead, archts., 2703 Kipling St., church, 555 Tallowood Lane, off Memorial Drive, $1,500,000. Ernest L. Vogt, Jr., 2712 Danville St., and Ralph J. Speich, 4235 Law St., consult. engrs.

▲ **Tex., San Antonio**—SHOPPING CITY, etc.—Community Realty Co., 3022 E. Houston St., plans by Reginald Roberts & Assocs., 2800 N. McCullough Ave., Section 2, 137,237 sq. ft. masonry store in Regional "Shopping City," $1,250,000, Montgomery Ward & Co., lessee, CD 12/12/58 Section 3, 650,000 sq. ft. masonry 56 store Regional "Shopping City," $6,500,000; Bids in 1960; addnl. auto and shopping area, hard pavement for Regional "Shopping City" use, $125,000; water lines, appurtenances for Regional "Shopping City" use, $58,000; addnl. earthwork, incl. grading, draining, leveling for Regional "Shopping City" use, $75,000, all on 58 acre tract, Hillview Center, Fredericksburg Rd. and Loop 13, Balcones Heights.

▲ **Tex., San Antonio**—OFFICE—Southwestern Bell Telephone Co., c/o Auditorium Circle, 6 story, bsmnt., 180,000 sq. ft., masonry air-conditioned Administra-

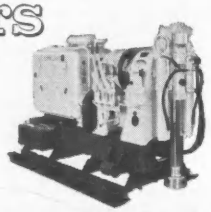
(Continued on page 100)

Longyear equipment saves drilling dollars

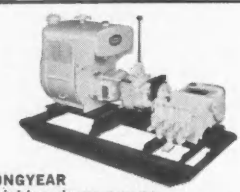


YOUR CREWS CARRY OUT drilling programs *faster* equipped with Longyear core drills. Longyear unitized drill rigs like this one slash moving and set-up time and increase operator efficiency. This Jeep rig consists of a powerful, gasoline-driven Longyear "24" diamond core drill, pump, and truss-type steel mast. Capacity is 675 feet with AW rods. Cab-over-engine Jeep and has 4-wheel drive able to move across roughest terrain.

ADV. 150



DRILL DEEP HOLES efficiently with a Longyear "44", a high-capacity drill throughout. The heavy duty planetary hoist has ample hoisting and braking power. NW twin hydraulic swivel head. Capacity: 3000 feet of AW rod. Skid or truck mounted.



LONGYEAR variable-volume pumps like this 5-speed 520RQ **help increase footage, bit life and core recovery.** The driller can instantly adjust volume and pressure over wide range . . . and pump into a closed circuit at every stage.

Longyear

E. J. Longyear Company, Minneapolis 2, Minnesota
Canadian Longyear Ltd., North Bay, Ontario
Longyear et Cie, Paris • Longyear N. V., The Hague

NEW! Presstite #55-MIL joint sealer resists jet blast, heat, fuel and oil... cures quickly...will not track

Here is the strongest, toughest, most economical sealant of its kind on the market today . . . *laboratory tested and field-service proved!* Presstite No. 55-MIL Sealer is a Polysulfide Polymer, two-component, cold-applied sealing compound, specifically designed for sealing joints in Portland Cement Concrete, military and commercial airfield paving, exposed to the action and operational requirements of jet aircraft.

1. **Resists repeated blast** from high jet turbine thrust.
2. **Resists super-elevated temperatures** of after-burner "cut-in".
3. **Resists impregnation** by foreign materials.
4. **Resists action of jet fuels:** JP-3, JP-4, JP-5; "SKYDROL" (fire-resistant hydraulic fluid); also detergents and oils.
5. **Resists action of repeated freeze-thaw cycles,** will not crystallize at sub-zero temperatures.
6. **Maximum adhesion** to clean concrete surfaces.
7. **High cohesive strength.**
8. **High ductility,** remains ductile at *minus* 20°F.
9. **Fast curing,** sets up tack and is track-free within 60 minutes after application.

For a joint sealant that will *last*—specify Presstite No. 55-MIL Sealer *first*—get tomorrow's sealer today!

Note: A modification of No. 55-MIL is available for sealing joints in PCC highways, bridge decks, parking lots and industrial floors. Known as Presstite No. 55-HWY (Highway Type). Your inquiry is invited. Write Dept. C-2.

PRESSTITE SEALING COMPOUNDS

PRESSTITE DIVISION
AMERICAN-MARIETTA COMPANY

K A P

3740 CHOUTEAU AVENUE • ST. LOUIS 10, MISSOURI

(Continued from page 98)

tive Office, Site No. St. Marys St., c/o N. McCullough Ave. $2,250,000.

▲ **Tex., Waco**—ACADEMIC, etc.—Baylor University, 1401 S. 5th St., Academic Bldg. $740,000; Classroom Bldg. No. 1, $750,000; Classroom Bldg. No. 2, $650,000; Classroom Bldg. No. 3, $500,000; Classroom Bldg. No. 4, $600,000; Dormitory No. 1, $1,000,000; Dormitory No. 2, $775,000; Dormitory No. 3, $900,000; Dormitory No. 4, $500,000; Dormitory No. 5, $650,000; Dormitory No. 6, $725,000; Field House and Gym., $1,750,000.

▲ **Va., Arlington**—APARTMENTS—Classic Builders, c/o Louis P. Courebis, 2643 Woodley Place N.W., Wash., D. C., plans by Walton & Assocs., 3510 Rhode Island Ave., Mount Rainier, Md., three 8 story apartments, Lee Highway, Old Dominion Dr. North Taylor St. and North Thomas St. $3,500,000. Lee Kendrick & Assocs., 3132 N. 10 St., consult. engrs.

▲ **Va., Arlington**—APARTMENT—Colonial Contg. Co., Inc., 2330 Wilson Blvd., plans by Walton & Assocs., 3510 Rhode Island Ave., Mount Rainier, Md., 90 unit apartment, Old Dominion Dr. and Lorchum Lane, $1,000,000. Lee Kendrick & Assocs., 3132 N. 10 St., consult. engrs.

▲ **Va., Norfolk**—STORE—National Bellas Hess N. Y. Corp., 111 8th Ave., New York, N. Y., store for Government Employee's Exchange, Inc. $1,000,000.

▲ **Va., Norfolk**—APARTMENTS—Norfolk Dist. Methodist Foundation, Inc., Park Place Church, 34 St. and Colonial Ave., 550 unit apartments, $7,000,000.

▲ **Va., Roanoke and Salem**—SHOPPING CENTER—Morris Skilken & Co., Inc., 696 E. Broad, Columbus, O., Lee-Hi Shopping Center, $2,500,000 (CORRECTION—owner). CD 12/24, under Lee-Hi Shopping Center, Inc., as owner.

▲ **Wash., Houghton** — APARTMENTS, etc. — Skinner Corp., Skinner Bldg., Seattle, Zone 1, plans by J. Graham & Co., 1426 5 Ave., Seattle, Zone 1, two 6 story apartments, several 2 story apartments, auditorium, swimming pool and boat moorage facilities. Over $2,000,000. Constr. this spring.

▲ **Wash., Spokane**—MOTOR HOTEL—The Dorie Co., 500 Wall St., Seattle, plans by Ross A. Lort, 1909 W. Broadway, Vancouver, B. C., 7 story, rein.-con. 120-room motor hotel, incl. 2-level parking facilities, restaurant, cocktail lounge and rooftop swimming pool, First and Lincoln Sts. $1,300,000. CD 2/11.

▲ **Wis., Baraboo**—HOSPITAL—St. Marys Ringling Hospital, hospital addn., alterations, $1,200,000.

▲ **Man., Winnipeg**—PARISH CENTRE—Sacred Heart Church, Bannatyne and Lydia St., parish centre, incl. church, school, convent, $3,000,000.

▲ **Ont., Ottawa**—OFFICE—Samuel Berger 227 Laurier Ave. W., office, 219 Laurier Ave. W. $1,500,000.

▲ **Ont., Richmond Hill**—HOSPITAL—Order of Grey Sisters, 700 Mackay St., Pembroke, 150-bed hospital, $1,500,000.

▲ **Ont., Toronto**—HOSPITAL—York General Hospital, 3185 Bathurst St., plans by Servos & Cauley, 619 Bayview Ave., 7 story, 180 bed, rein.-con. hospital, Dufferin St. and Playfair Ave. $2,000,000. Ralph C. Manning & Assocs., 745 Mt. Pleasant Rd., consult. engrs.

▲ **Que., Montreal**—OFFICE—Owner, c/o Charles Grenier, 3600 Barclay Ave., 14 story, rein.-con. office, Dorchester Blvd., corner St. Alesandre St., $4,000,000.

INDUSTRIAL BUILDINGS

▲ **Ala., Bessemer**—FACTORY, etc.—H. K. Porter Co., Inc., Refractories Div., 2800 Alabama Ave., factory and storage facilities, tunnel kiln, dryers and brick marking facilities. $2,000,000.

▲ **Ark., Fort Smith**—PLANT—Borg-Warner Corp., Norge Div., 310 S. Michigan Ave., Chicago, Ill., 1 story, 1,000,000 sq. ft. refrigerator and appliance mfg. plant, $10,000,000.

▲ **Ill., Chicago**—FACTORY—Muffler Corp. of America, 2501 W. 24 St., plans by A. Epstein & Sons Co., 2011 Pershing Rd., 156,000 sq. ft. factory. $2,000,000.

▲ **Ill., Chicago**—PLANTS—Regensteiner Corp., 310 S. Racine Ave., Chicago, redeveloping printing plants, 1224 W. Van Buren St. and 310 S. Racine Ave., $2,000,000.

▲ **N. J., Clifton**—PLANT, etc.—Dixon Chemical & Research, Inc., Alwood Rd., Bloomfield, plans by Emil Schmidlin, Evergreen Place, East Orange, plant and office expansion, Broad St. and Hepburn Rd. $1,000,000. CD 7/14.

▲ **O., Cleveland** — PLANT — Addressograph-Multigraph Corp., 1200 Babbitt Rd., Zone 32, plans by Dalton-Dalton Assocs., The Arcade, Zone 14, 140,000 ft. chrome plating plant division addn. $1,400,000. CD 3/26.

▲ **Tex., Denton**—POWER PLANT addn.—City, City Hall, voted bonds Jan. 30, electric power plant addn., $4,750,000. CD 1/25.

▲ **Tex., Houston**—MANUFACTURING PLANT—Kaiser Gypsum Co., 1924 Broadway, Oakland 12, Calif., Gypsum Products Manufacturing Plant, $4,000,000; loading and unloading docks, $125,000; repair shop, $150,000; site earthwork, $70,000; paved plant area and auto center, $95,000; 25-acre site on Ship Channel. Kaiser Engineering Div., Henry J. Kaiser Co., 1924 Broadway, Oakland 12, Calif., consul.-engr.

▲ **Tex., Houston**—PLANT—Olin Mathieson Chemical Corp., Ship Channel, fertilitzer plant enlargement, $1,350,000.

▲ **Tex., Houston** — PETROCHEMICAL PLANT — Sinclair Oil Co., 600 5th Ave., New York, N. Y., and Koppers Co., Koppers Bldg., Pittsburgh 19, Pa., petrochemical plant to produce styrene monomer, LaPorte Rd. and Ship Canal. $10,000,000.

▲ **Wash., Kalama**—PHENOL PLANT—Dow Chemical Co., Midland, Mich., phenol plant. Over $2,000,000. Constr. next month.

▲ **Alta., Rimbley**—PLANT—British American Oil Co., Ltd. & Assocs., 800 Bay St., Toronto, Ont., gas gathering and processing plant, $9,000,000.

▲ **Que., Montreal**—PLANT—Crush International Ltd., 1590 O'Connor Dr., Toronto, Ont., plant, Villeray St. $1,000,000.

UNCLASSIFIED

▲ **Calif., Martinez**—SMALL CRAFT HARBOR—City, City Hall, small craft harbor. $1,300,000. J. H. Pomeroy, Inc., 210 Montgomery St., San Francisco, consult. engr.

▲† **Calif., Pasadena**—LABORATORY FACILITIES, etc.—National Aeronautics & Space Admin., Jet Propulsion Laboratory, Pasadena, modernization of laboratory facilities, $2,335,300 (no appropriation); solid propellant facility, $1,954,700 (no appropriation); liquid propellant test cell, $500,000 (no appropriation).

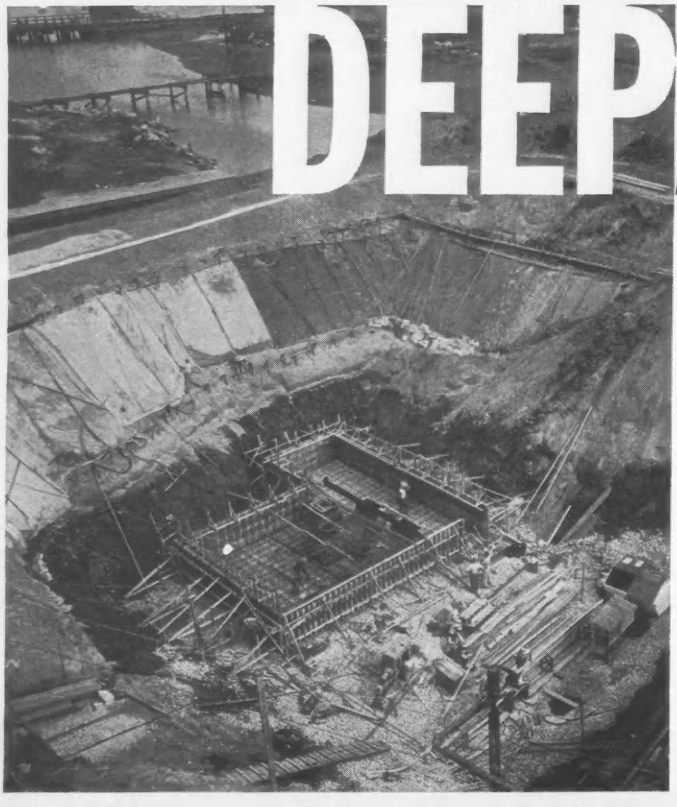
▲ **Ill., St. Jacob**—NATURAL GAS STORAGE RESERVOIR—Mississippi River Fuel Corp., 407 N. 8th St., St. Louis 1, Mo., natural gas underground storage reservoir, 12,000 acre site south of here. $7,800,000. Plan to spend $3,250,000 first phase of project in 1960.

▲ **Ohio**—FUEL GAS COMPRESSION STATION—Ohio Fuel Gas Co., 99 N. Front St., Columbus, 6,000 hp. fuel gas compression station, Lucas, Richland Co. $1,500,000.

▲ **Wash., Seattle**—TRANSPORTATION CENTER, etc.—Port of Seattle, Bell St. Terminal, plans by C. A. Baylon & Assocs., Lowman Bldg., Zone 4, transportation center at site of existing Colman Dock ferry terminal, incl. multi-story office bldg. $3,500,000. CD 8/7.

▲ **W. Va., Wheeling**—VEHICULAR TUNNEL—State Dpt. Hys., vehicular tunnel through Wheeling Hill to New 9th St. Bridge, FAI Project, $9,000,000, Richardson, Gordon & Assoc., 3 Gateway Center, Pittsburgh, Pa., counsult. engrs. for tunnel approaches. Singstad & Baillie, 24 State St., New York 4, N. Y., engrs. for tunnel. Tippetts, Abbett, McCarthy, Stratton, 375 Park Ave., New York 22, N. Y., staff engrs. CD 11/15/54, under City as owners.

▲ **Que., Granby**—RECREATION CENTRE—Owner, c/o Recreation Centre Committee, Granby Bd. of Trade, and Richard Thibodeau, 252 Dufferin St., recreation centre. $1,000,000.



DEEP AND DRY

A Stang wellpoint system is predraining and stabilizing this pump station jobsite quickly, economically and efficiently. The site is clear, conditions are very workable. This is typical of Stang jobs.

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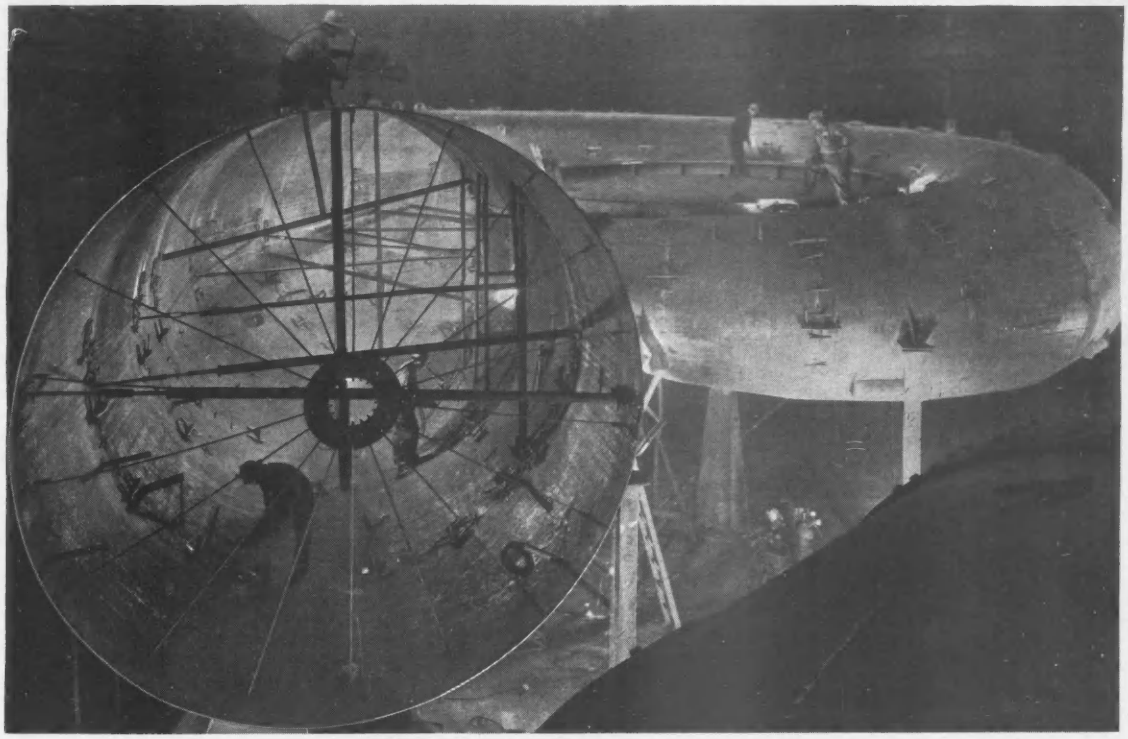
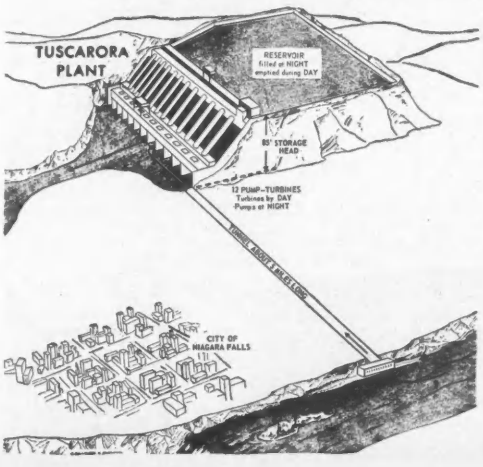


THE BIGGEST MADE IN THE U.S.A., this reversible pump-turbine scroll case has inlet diameter of 18 ft, measures 56 ft across. It's designed for one of Tuscarora's 12 Allis-Chalmers pump-turbines.

Now building 12 reversible pump-turbines for Tuscarora—

world's largest pumped-storage project



Power plant by day, pumping station at night — the New York State Power Authority's Tuscarora plant will capitalize on the hydroelectric power potential of the Niagara River without adversely affecting the scenic beauty of the Falls.

The largest project of its kind, Tuscarora will have 12 reversible pump-turbines . . . all designed and fabricated by Allis-Chalmers. As a turbine, each of these units is rated at 28,000 hp under 75-ft head. In reverse, as a pump, each is rated at 3400 cfs against 85-ft head. All will be direct-connected to Allis-Chalmers generator-motors — rating 25,000 kva at .8 P.F. as generators . . . 37,500 hp at 100% P.F. in reverse as motors.

The selection of Allis-Chalmers to design and build the above components came naturally. A-C is the only builder of complete reversible pump-turbine installations — with a record that includes the world's largest pumped-storage projects.

Look to Allis-Chalmers for leadership in the design, engineering and manufacture of hydraulic turbines and necessary accessories such as valves, pumps, trash rakes, water control gates and hoists. *For information, contact your nearby A-C office . . . or write* **Allis-Chalmers,** *Hydraulic Division, York, Pa.*

Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 3 New Hampshire March 7 Connecticut

STREETS AND ROADS

March 1 Massachusetts

BUILDINGS—BA

▲ **Conn., Enfield** — SCHOOL — BA 3/15 — Town, Town Hall, N. Main St., Thompsonville, high school, Rte. 5. $3,000,000. Plans deposit $150. Olsen & Miller, 742 Asylum Ave., Hartford, archts. A. John Macchi, 57 Farmington Ave., Hartford, engr. CD 2/5/58.

Mass., East Longmeadow—SCHOOL—BA 3/16—Birchland School, 50 Hanward Hill, Mountain View Elementary School, Somers and Hampden Rds. $944,000. Plans deposit $75. Warren H. Ashley, 740 North Main St., West Hartford, Conn., archt. CD 1/8.

HEAVY CONSTRUCTION—LB & CA

▲ **CONNECTICUT**—State Hy. Comr., 170 Douglas St., Hartford,

Brunalli Constr. Co., Inc., 109 Summer St., Southington, Conn., CA $3,350,776, 21,692 lin. ft. relocation Rte. U.S. 6, incl. 5 bridges and 1 box culvert, Proj. 182-07, Fed. Aid Proj. EI-84-2 (15) (35), Cheshire and Waterbury. Bids Jan. 11. CD 1/13, under LB.

BUILDINGS—LB & CA

C. Profenno Co., 127 Marginal Way, Portland, Me., LB $876,000, est. $900,000, Base Bid, ELEMENTARY SCHOOL addn., Pond Cove Section, HIGH SCHOOL addns., Cape Elizabeth, SCARBORO, ME. Town, Cape Elizabeth, Supt. Schools, Scarboro, Me. Bids Feb 11. CD 1/20.

J. S. Nasin, P.O. Box 145, Willimantic, Conn., CA $836,742, HIGH SCHOOL, Rte. 12, Central Village, PLAINFIELD, CONN. Town, Bd. Educ., Plainfield, Conn. Bids Jan. 26, awarded Feb. 11. CD 2/1, under LB.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 17 New York

STREETS AND ROADS

March 1 Maryland March 17 New York

† **Newfoundland, Argentia**—COMMUNICATION FACILITIES—BA 3/24—Area P. Wks. Office, New York, Rm. 633, Federal Office Bldg., 90 Church St., New York 7, N. Y., constr. three 1 story rein.-con. structures (equipment, generator and pump house) various sizes to incl. overhead and underground power lines, exterior services, paving, 50 ft circular structural steel tower, steel antenna and reflector towers and pertinent equip. (all government-furnished) will be installed, etc., U. S. Naval Station, NBy 26862, Spec. No. 26862/60. $500,000-$1,000,000. Plans deposit $70. CD 9/28.

BUILDINGS—BA

▲ **N. J., Phillipsburg**—HIGH SCHOOL—BA 3/1—Diocese of Trenton, Lawrenceville Rd., Trenton, 2 story high school for St. Philip and St. James Parish. $1,-000,000. Alfred Claus, 114 W. State St., Trenton, archt. CD 9/25.

▲ **D. C., Wash.**—OFFICE—BA 3/10—National Education Assoc., 1201 16 St. N. W., office bldg. parking, Stage 4, (formerly called Service Bldg). $1,800,000. Plans deposit $75. Saunders & Assoc., 3636 King St., Alexandria, Va., archts. CD 12/21/56.

▲ **N. Y., New York**—HOUSING—BA 3/22—New York City Housing Auth., 299 Broadway, Zone 7, Proj. NYS-94, Audubon Houses, W. 154th St., West 155th St. and Amsterdam Ave., Manhattan Boro. Greenberg & Ames, 303 Fourth Ave., Zone 10, archts. CD 11/10.

▲ **N. Y., West New Brighton**—HOUSES—BA 4/21—New York City Housing Auth., 299 Broadway, New York, Zone 7, Proj. NY5-40, West Brighton Houses, Castleton and Henderson Aves., Alaska and Campbell Sts., Richmond Boro. $10,000,000. Irwin Clavan, 355 Lexington Ave., New York 17, N. Y., archt. CD 11/27.

▲ **N. Y., New York**—HOUSES—BA About 6/2—New York City Housing Auth., 299 Broadway, Zone 7, Proj. NYC-28, Senator Robert A. Taft Houses, Section II, Bldgs. 5 to 10, East 112 St., East 115 St., Park Ave. and 5th Ave. De Young & Moscowitz, 205 E. 42nd St., Zone 17, archts. CD 4/6/55.

HEAVY CONSTRUCTION—SLC

▲ **Pa., Pottstown**—SERVICE BLDG.—American Telephone & Telegraph Co., 400 Hamilton Ave., White Plains, N. Y., soon lets contract underground service bldg. and repeater station, $1,000,000. Alfred Easton Poor, 400 Park Ave., New York, N. Y., archt.-engr. CD 11/24.

HEAVY CONSTRUCTION—LB & CA

▲ **United States Steel Corp.,** 71 Broadway, New York 6, N. Y., LB $56,896,390, (3 bidders), Narrows Bridge Contr. No. NB-3, cables and suspenders, NEW YORK. Triborough Bridge & Tunnel Auth., Administration Bldg., Randall's Island, New York 35, N. Y. Bids Feb. 16. CD 1/14.

▲ **Spearin, Preston & Burrows, Inc.,** 50 Church St., New York 7, N. Y., LB $5,117,407, (7 bidders), Contr. 6, plant outfall, Newtown Creek Pollution Control Project, Brooklyn Boro, BROOKLYN, N. Y. Dpt. P. Wks., Rm. 2200, Municipal Bldg., New York 7, N. Y. Bids Feb. 10. CD 2/4.

▲ **PENNSYLVANIA**—Pa. Hys. Dpt., 506 North Office Bldg., Harrisburg,

Marsolino Constr. Co., P.O. Box 192, Uniontown, Pa., CA $4,177,525, 15,800 ft. rein.-con. 24 ft. wide each side earth median, 10 bridges (Interstate) L.R. 798, Sec. 1-A, portion of Washington, Pa. By-Pass, Washington Co. Bids Dec. 18. CD 12/23, under LB.

McElwee-Courbis Constr. Co., 6209 Crescent Blvd., Camden, N. J., LB $814,000, sewage treatment plant, ATHENS, PA. Athens-Sayre Joint Auth., Sayre, Pa. Bids Feb. 8. CD 1/27.

BUILDINGS—LB & CA

John T. Brady & Co., Inc., 606 W. 47th St., New York 19, N. Y., CA $992,000, general contract CHILDREN'S COURT and PROBATION DEPARTMENT BLDG., EAST MEADOW, N. Y. Bd. Supervs. Nassau County, Old County Court, Mineola, N. Y. Bids Dec. 22. CD 1/6, under LB.

▲ **Messina & Briante, Inc.,** 10 Beech St., Port Chester, N. Y., Owner Builds, Est. $4,000,000, 9 story OFFICE, 3½ acre tract, southside of Boston Rd. and New England Thruway, PORT CHESTER, N. Y. William L. Weigle, 175 Main St., White Plains, N. Y., archt.

Regency Estates, 42 Park Place, Morristown, N. J., Owner Builds, $800,000, 35 HOUSES, La Malfa Rd., Randolph Twp., MORRISTOWN, N. J.

▲ **Birdsboro Corp.,** 1941 Furnace St., Birdsboro, Pa., CA BLOOMING MILL to roll up to 54 in. slabs, CONSHOHOCKEN, PA. Alan Wood Steel Co., Ivy Rock, Conshohocken, Pa. Total est. $30,000,000. CD 11/13;

Mesta Machine Co., West Homestead, Pa., CA PLATE MILL to roll plates up to 96 in. (Conshohocken, Pa.).

▲ **Paul Tishman Co., Inc.,** 21 East 70 St., New York, N. Y., CA $4,347,786, general construction Eastern Pennsylvania SCHOOL and HOSPITAL for child mental patients, Bensalem Twp., Bucks County, PHILA., PA. General State Auth., 18th and Herr Sts., Harrisburg, Pa., Grand total $7,147,463. Bids Jan. 20. CD 1/22, under LB;

The Welsbach Corp., 1500 Walnut St., Phila., Pa., CA $1,387,131 heating and air conditioning school and hospital, (Phila., Pa.);

Riggs Distler & Co., Inc., 1518 Walnut St., Phila., Pa., CA $546,546, interior plumbing school and hospital (Phila., Pa.);

Alert Electric Co., 248 North Juniper St., Phila., Pa., CA $866,000, electric work school and hospital, (Phila., Pa.).

▲ **Charles R. Serivener Co., Inc.,** 240 S. Hilton St., Baltimore 29, Md., CA $1,200,000, brick, concrete, steel block Perry Hall SHOPPING CENTER, incl. parking area, BALTIMORE, MD. Perry Hall Shopping Center, c/o Rich. Carter, 8403 Liberty Rd., Baltimore 7, Md. J. Eldridge Moxley & Son, 12 E. 24th St., Baltimore 18, Md., archts. CD 7/9, under LB.

▲ **Frederick Constr. Co.,** Frederick, Md., LB $1,041,064 (8 bidders), men's DORMITORY and DINING HALL No. 2, Maryland University, COLLEGE PARK, MD. State Dpt. P. Imprvts., 301 W. Preston St., Baltimore 1, Md. Bids Feb. 16. CD 2/9.

American Constr. Co., 261 Constitution Ave. N. W., Wash., D. C., LB $827,000, (15 bidders), 50,000 sq. ft. ELECTRONICS MANUFACTURING PLANT and OFFICES, Montgomery Industrial Park, ROCKVILLE, MD. U. S. Industries Roboydne Co., 8411 2nd St., Silver Spring, Md. Bids Feb. 10. CD 1/21.

▲ **Scott Constr. Corp.,** 1737 H St. N.W., Wash., D. C., CA Est. $2,000,000, HOTEL, 1515 Rhode Island Ave. N.W., Wash., D. C. David R. Isen, 1737 H St. N.W., Wash., D. C. Walter Bucher, 918 Sligo Ave., Silver Spring, Md., archt.

SOUTH

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 16, 23 Virginia

STREETS AND ROADS

March 16, 23 Virginia

BUILDINGS—BA

▲† **Va., Norfolk** — ACADEMIC — BA 3/15 — Dist. P. Wks. Office, 5th Naval Dist., U.S. Naval Station, Norfolk, academic bldg. Armed Forces Staff College Naval Base, IFB NBy 24516. CD 9/30.

BUILDINGS—SLC

▲ **Va., Bassett**—PLANT OFFICES—Bassett Furniture Industries, soon lets contract plant offices, $1,500,-000. J. Coates Carter, Martinsville, archt. CD 12/3.

HEAVY CONSTRUCTION—LB & CA

▲ **VIRGINIA**—State Hy. Dpt., 1121 E. Broad St., Richmond,

Va.—**Thorington Constr. Co., Inc.,** 2106 N. Hamilton, Richmond, Va., CA $930,830, 5 bridges on project from Potomac River to near Rte. 123, Rte. 738 over interstate route and Scotts Run, twin structures where interstate crosses Scotts Run, 4-lane bridge where Rte. 193 crosses over interstate, 2-lane bridge for service road to cross interstate and 4-lane structure where George Washington Parkway overpasses the Interstate route, Washington Circumferential Rte., Interstate Rte. 413, Fairfax Co.;

Va.—**Sanford Constr. Co. Inc.,** Sanford, N. C., CA $658,403, bridge over Long Creek and Beach Canal and 1.02 mi. approach road south from U.S. 60 about 1 mi. east of Lynnhaven Inlet, Rte. 615, Princess Anne Co. Bids Feb. 3. CD 2/8, under LB.

▲ **VIRGINIA**—State Hy. Dpt., 1221 E. Broad St., Richmond,

Va.—**Adams Constr. Co.,** 2725 Roanoke Ave. S.W., Roanoke, Va., CA $583,933, 1.9 mi. divided constr. from U.S. Rte. 11 to airport, Rte. 117, Roanoke Co.;

Va.—**Richard F. Kline, Inc.,** Frederick, Md., CA $1,906,351, concrete paving and 3 bridges from 0.85 mi. north of Rte. 236 to 0.26 mi. north of U.S. Rte. 50, the bridges incl. 2 for interchange at U.S. 50 and 1 to take Rte. 709 (Gallows Rd.) over Interstate Rte., Fairfax Co.;

Va.—**A. B. Burton Co. Inc.,** Wards Rd., Lynchburg, Fla., CA $793,197, 3.49 mi. grading, draining and service roads, incl. 2,000 ft. on U.S. 11 from 0.8 mi. west of Rte. 11-100 to 1.7 mi. west of Pulaski-Wythe Co. Line, closing the gap between projects under construction west of Newbern and project under construction east of Wytheville, Wythe and Pulaski Counties. Grand total $3,283,481. Bids Feb. 3. CD 2/8, under LB.

▲† **C. J. Langenfelder & Sons, Inc.,** 8427 Pulaski Highway, Baltimore, Md., CA $3,941,535, Alternate 2, first section of access road for Dulles International Airport, CHANTILLY, VA. Federal Aviation Agency, 16 and Constitution Ave. N.W., Wash., D. C. Bids Feb. 10. CD 2/12, under LB.

▲ **City of High Point,** City Hall, High Point, N. C., cancelled bids to have been opened Feb. 24, 83,000 lin. ft. sanitary sewer outfall lines, HIGH POINT, N. C. $1,200,000. William F. Freeman, Inc., 116 E. Commerce St., High Point, N. C., engr. CD 1/6.

▲ **FLORIDA**—State Rd. Dpt., Tallahassee,

Wright Contr. Co., Box 1580, Columbus, Ga., CA $2,879,-160, 6-lane divided b. conc. pavement, limerock base Type 1 c. conc. surf. course and binder course, limerock base shoulders, Type 1-B surf. tr. 1.019 mi. SR 25, FAI Proj. No. I-195-1 (13) 5, Job No. 87090-3405, Dade Co. Bids Dec. 15, awarded Feb. 8. CD 12/18, under LB.

† **Southern Wall Drip Co., (Southern Engineering & Constr. Co., Inc.),** 2650 Cherry Ave., Long Beach, Calif., LB $993,393, propellant loading system Complex 36, Cape Canaveral Missile Test Center, ENG-08-123-60-32, COCOA, FLA. U. S. Eng., P.O. Box 4970, Jacksonville 1, Fla. Bids Feb. 11. CD 2/4.

James H. Craggs Constr. Co., P.O. Box 22, Gainesville, Fla., LB $806,478, paving runway, aprons, parking

(Continued on page 104)

Engineers and contractors all over the U. S. and Canada are investigating the economy of factory-built sewage lift stations and getting the story first-hand from Smith & Loveless' award-winning movie.

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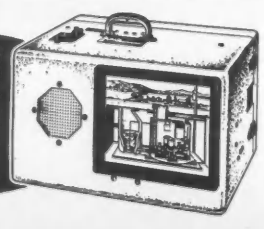
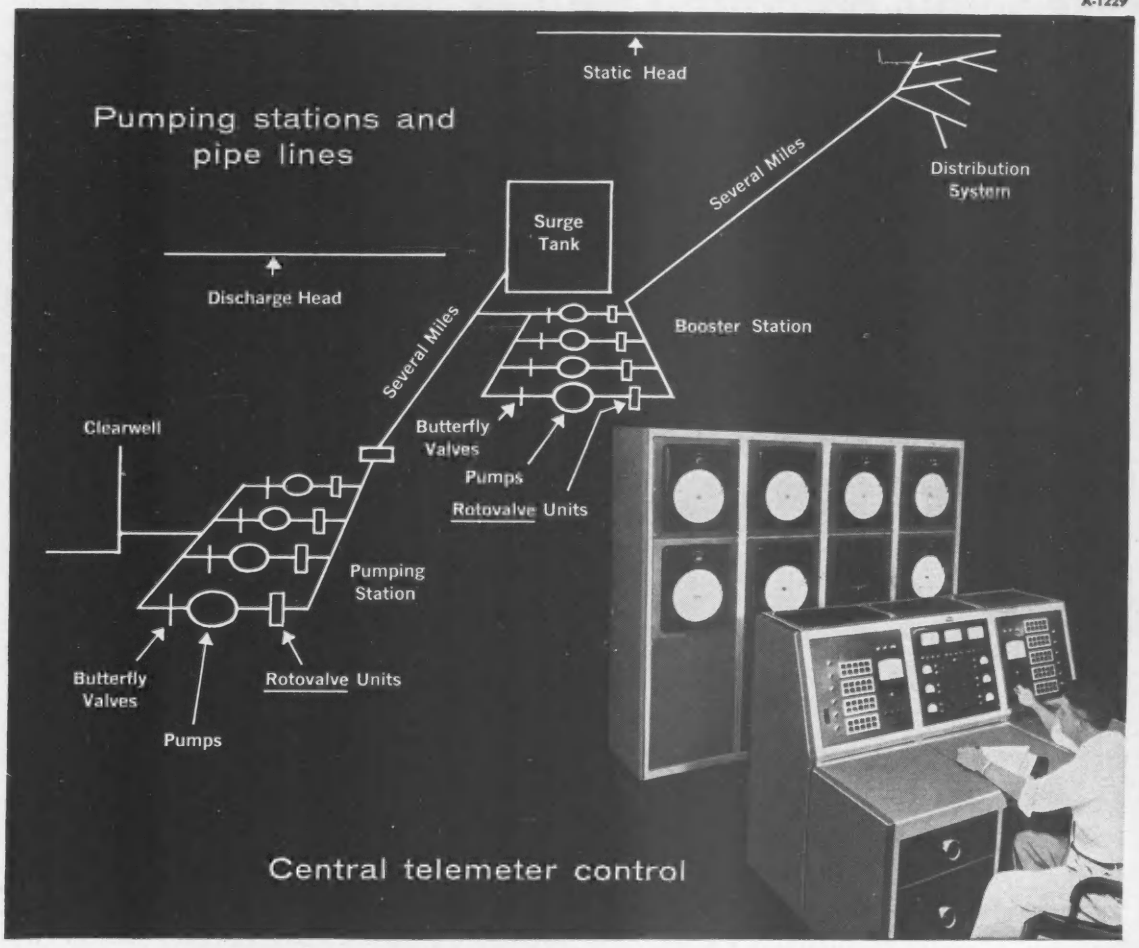


ALLIS-CHALMERS

A-1229



One man controls 60 mgd with

telemetered valving

Pumping stations operate completely unattended, controlled from a central remote console in this major water procurement and distribution system. Rated for 60-mgd peak load, it distributes over a 100-square-mile area from widely separated stations and storage tanks.

This is another dramatic example of complete valving service offered industry by Allis-Chalmers. Whatever you're dealing with, liquids or gases, including highest temperatures and pressures — Allis-Chalmers is your convenient source of today's most comprehensive rotary valve line. Types and sizes cover virtually every need . . . including *Rotovalve* units, butterfly and wafer valves and ball valves. We can also assist you in every phase of planning, engineering and installation. *Contact your Allis-Chalmers representative, or write* ***Allis-Chalmers, Hydraulic Division, York, Pa.***

Rotovalve is an Allis-Chalmers trademark.

Key to a superior valving system, Rotovalve **units offer the least pressure loss . . . ideal flow characteristic . . . controlled timing . . . positive seating . . . easy operation always.**

Exclusive

POW-R-GRIP*

Ridges!

Anchor anything to concrete...permanently

BULLDOG
Gold Digger.

*POW-R-GRIP ridges around the shank of the BULLDOG "Gold Digger" drill/anchor permit *faster, easier drilling* into hardest concrete, brick or stone. Once the drill/anchor is set, these powerful ridges, plus the proven expansion principle of "Gold Digger" drill/anchors, assure greatest holding-power under all job and climatic conditions. Only POW-R-GRIP ridges assure "the grip that never fails". *Send for full details today!*

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GREGORY INDUSTRIES, INC.
102-40 Toledo Avenue • Lorain, Ohio

BULLDOG DIVISION
(Formerly Polis Manufacturing Co.)
GREGORY INDUSTRIES, INC.
102-40 Toledo Avenue • Lorain, Ohio
Please send *free* specification and application booklet.

Name_____
Firm_____
Address_____
City_____ Zone___ State_____

(Continued from page 102)

area and access roads, TALLAHASSEE, FLA. City, City Hall, Tallahassee, Fla. Bids Feb. 10.

BUILDINGS—LB & CA

▲ **C. L. Lewis & Co.**, Lynchburg, Va., CA $1,053,896, BANK, LYNCHBURG, VA. First National Trust & Savings Bank, 811 Main St., Lynchburg, Va. Bids Jan. 21, awarded Feb. 11. CD 1/29, under LB.

▲ **Thompson & Street Co.**, 2622 Piedmont Rd. N.E., Atlanta, Ga., LB $1,886,000, CATHEDRAL, ATLANTA, GA. St. Phillips Episcopal Church, 2744 Peachtree Rd. N.E., Atlanta, Ga. Bids Feb. 11. CD 1/6.

▲ **Abco Builders, Inc.**, 90 Rogers St. N.E., Atlanta, Ga., CA $1,356,000, Briarcliffe HIGH SCHOOL addn., DECATUR, GA. DeKalb Co. Bd. Educ., DeKalb Bldg., Decatur, Ga. Bids Jan. 26. CD 2/2, under LB.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 1 Michigan — March 8 Indiana, Wisconsin

STREETS AND ROADS

March 1 Michigan — March 8 Wisconsin

▲ **Wis., Milwaukee**—PIER, etc.—BA 3/21—Bd. Harbor Comrs., constr. municipal south pier, transit sheds and utilities. $2,250,000. Plans deposit $75. R. C. Krahn, c/o owner, engr. CD 1/11.

BUILDINGS—BA

▲† **Ill., Great Lakes**—RECRUIT BARRACKS—BA 3/9—Dist. P. Wks. Office, Bldg. 1-A, Great Lakes, recruit barracks, 1st increment of 2nd Camp, Naval Training Center, Spec. No. 14771/60. Over $1,000,000. Plans deposit $60. CD 9/8/58.

▲† **Ill., Savanna**—WAREHOUSE, etc.—BA 3/17—U. S. Eng., 475 Merchandise Mart, Chicago, Zone 54, 437 sq. ft. guard house, 1,920 sq. ft. warehouse, 6,000 sq. ft. check and assembly bldg., ten rein.-con., 26 x 80 ft. magazines, site work, incl. water, sewer and electrical lines, road paving, fencing, clearing, grubbing, grading, Savanna Ordnance Plant, ENG-11-032-60-30. $1,000,000. CD 9/25.

HEAVY CONSTRUCTION—LB & CA

▲ **MICHIGAN**—State Hy. Dpt., Escanaba, Bids opened 2/10,

Mich.—**Alpine Constr. Co.**, St. Ignace, Mich. and **Gilliland Constr. Co.**, 422 Washington, Alpena, Mich., LB $958,844, grading, drainage structures 8.9 mi. relocated US 141 from Iron-Barage County Line south to near Little Hemlock River, Iron Co.;

Mich.—**George H. Hocking**, Donken, Mich., LB $680,732 aggreg. surf. 16.5 mi. M-26 from Painesdale south to about 1 mi. south of Lake Roland, Houghton Co. CD 1/22.

BUILDINGS—LB & CA

▲ **Alex Fodor Realty Co.**, 3308 Lorain Ave., Cleveland 13, O., Owner Builds, $2,000,000, Unit 11, 99 HOMES, Smith Rd., Montvale Dr., Lindmont Dr. and Michael Dr., BROOK PARK, O.

Brown Constr. Co., 3334 Prospect Ave., Cleveland 15, O., CA Est. $800,000, (18 bidders), 3 story, 42,000 sq. ft. parts finishing bldg., and 22,400 sq ft. press room pits PLANT ADDNS., CLEVELAND, O. Fisher Body Division General Motors Corp., General Motors Technical Institute, 30001 Van Dyke, Detroit, Mich. Argonaut Realty Div. General Motors Corp., Argonaut Bldg., Detroit, Mich., archts.

▲ **Marvin Helf**, 10001 Carnegie Ave., Cleveland 6, O., Owner Builds, $2,250,000, 168 HOMES, Arrow Trails Homes, Rte. 43 north of Rte. 14, STREETSBORO, O.

W. H. Marhoefer, Jr., 2424 N. 25 Ave., Franklin Park, Ill., LB $800,000, general contract HOSPITAL addn., LAGRANGE, ILL. Community Memorial Hospital, Willow Springs Rd., LaGrange, Ill. Bids Jan. 15. Schmidt, Garden & Erickson, 104 S. Michigan Ave., Chicago 3, Ill., archts. CD 3/6/58.

▲ **Coathe & Goss, Inc.**, 5103 W. Lake St., Chicago 44, Ill., CA $1,647,685, general contract Hawley St. HIGH SCHOOL addn., LIBERTYVILLE, ILL. Liberty-Fremont High School, Butler Lake Bldg., Libertyville, Ill. Bids Feb. 4. CD 2/15, under LB.

▲ **Barmac Constr. Co.**, Chester, Ill., CA $1,320,990, brick, concrete, etc. HOSPITAL, ROBINSON, ILL. Crawford Co. Memorial Hospital, Robinson, Ill. Bids Feb. 2. CD 2/9, under LB.

MISSISSIPPI TO ROCKIES

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

March 3 Kansas — March 15 Texas

STREETS AND ROADS

March 2 Arkansas — March 3 Kansas

March 15, 16 Texas

▲† **Neb., Lincoln**—OPERATIONAL BASES—BA 4/11—U. S. Eng., 1709 Jackson St., Omaha, Zone 2, constr. WS-107A-1 operational bases, Missile Launching Sites, 551-1 through 551-9, vicinity of Lincoln Air Force Base, ENG-25-066-60-52. $10,000,000. CD 1/21.

▲† **South Dakota**—BA On Or About 4/14—U.S. Eng., 1709 Jackson St., Omaha 2, Neb., penstocks and surge tanks, incl. 7 horizontal free standing steel penstocks 24 ft. in diam., extending approx. 294 ft. upstream from powerhouse, 2 risers 81 ft. high, 12 risers 16 ft. in diam. and two 17 ft. in diam., 14 steel surge tanks each 70 ft. in diam. and approx. 145 ft. high, penstock supports and penstock-riser "Y" encasement. Oahe Reservoir Project, near Pierre, CIV NG-25-066-60-65, $10,000,000. CD 9/29.

BUILDINGS—BA

Iowa, Webster City—SCHOOL—BA 3/1—Bd. Directors, Community School Dist., 1 and 2 story, 272 x 312 ft. Senior-Junior High School. $800,000. Savage & Ver Ploeg, 12th and Grand Sts., West Des Moines, archts. CD 11/3.

Mo., St. Louis County—STORE—BA 3/3—Central Hardware Co., 4200 Union Blvd., St. Louis, Zone 15, 1 story, 60,000 sq. ft., 204x330 ft. masonry, steel, concrete store, 700-car parking area, U.S. No. 66, Old and New Halls Ferry Rds., Central City Area. Over $500,000. Russell, Muligardt, Schwarz, Van Hoefen, 1620 Chemical Bldg., 721 Olive St., St. Louis 1, Mo., archts. Otto E. Heinicke & Co., 122 N. 7th St., St. Louis 1, Mo., structural engrs. Belt & Given, 8920 Manchester Rd., Brentwood 17, Mo., mechanical engrs. CD 10/28.

Tex., Fort Worth — HIGH SCHOOL — BA 3/16 — Fort Worth Public Schools, 1 story, 66,000 sq. ft. masonry, concrete, steel Diamond Hill Junior High School. $807,000. Plans deposit $50. Preston M. Geren, 1607 Fort Worth National Bldg., archt. CD 2/19/58.

▲ **Mo., Kirksville**—DORMITORY—BA 4/1—Northeast Missouri State Teachers College, 4 story, 70,000 sq. ft., brick, steel, concrete dormitory, Proj. Mo. 23-CH 52D. Over $1,300,000. Pearce & Pearce, Inc., 721 Olive St., St. Louis, Zone 1, archt. CD 2/19.

HEAVY CONSTRUCTION—LB & CA

▲ **KANSAS**—State Hy. Comn., Wichita,

Kan.—**Clarkson Constr. Co.**, Box 4924, Sta. F, Kansas City 1, Mo., CA $709,752, grading 1.72 mi. SP 235-87 I 235-1 (14) 43 Pt. I, Sedgwick Co.;

Kan.—**Grosshans & Petersen, Inc.**, Box 167, Marysville, Kan., CA $569,953, grading 2.779 mi. SP 235-87 I 235-1 (35) 49 Pt. II, Sedgwick Co. CD 2/16, under LB.

▲† **Sharp Bros. Contg. Co.**, 1014 E. 19th St., Kansas City, Mo., CA $1,462,575, est. $1,500,000, 167 x 192 ft. air traffic control center, utility and office bldg., Inv. No. 3-60-20, OLATHE, KAN. Federal Aviation Agency, Region 3, Procurement Branch, Rm. 110, 4825 Troost, Kansas City 10, Mo. Bids Jan. 7, awarded Jan. 28. CD 1/13, under LB.

BUILDINGS—LB & CA

▲† **Weitz Constr. Co., Inc.**, 406 Flemming Bldg., Des Moines, Iowa, CA $2,412,000, BUILDING No. 1 addn., alterations, Veterans' Administration Center, DES MOINES, IOWA. Veterans' Admin., Munitions Bldg., Wash., D. C. Bids Feb. 2. CD 2/4, under LB.

▲ **MacDonald Constr. Co.**, 1310 S. Grand Blvd., St. Louis 4, Mo., CA Est. over $1,500,000, 1 story, 200,000 sq. ft. STORES in Grandview Shopping Plaza, 66 By-Pass east of Washington Ave., FLORISSANT, MO. Henry Schanedling Sons Corp., 6505 Wilshire Blvd., Los Angeles, Calif. CD 12/10/57.

▲ **Alberici Constr. Co.**, 1550 Irving Ave., St. Louis 20, Mo., CA Est. $1,000,000, 3 and 4 story L-shaped 80x440 ft. and 120x225 ft. brick, steel, concrete AUTOMOTIVE PLANT addn., ST. LOUIS, MO. General Motors Corp., Chevrolet St. Louis Div., 3809 Union Bldg., St. Louis 15, Mo. Bids Jan. 22. CD 1/20.

▲† **Burl Johnson & Co.**, 2570 South Harvard, Tulsa, Okla., LB $4,892,050, 300 family HOUSING UNITS, Clinton-Sherman Air Force Base, Inv. 34-611-6012, CLINTON, OKLA. Base Procurement Office, Clinton Sherman Air Force Base, Clinton, Okla. Bids Jan. 27. CD 12/31.

Linbeck Constr. Corp., P.O. Box 13007, Houston, Tex., CA $985,000, 10 story, 200,000 sq. ft., concrete frame PARKING GARAGE addn., HOUSTON, TEX. Foley's Parking Garage, 811 Dallas Ave., Houston, Tex. CD 1/6.

Eagle Constr. Corp., Loveland, Colo., CA Approx. $750,000, 100,000 sq. ft. first unit RESEARCH MFG. PLANT, LOVELAND, COLO. Hewlett Packard Corp., 275 Page Mill Rd., Palo Alto, Calif. CD 12/17.

Rio Grande Constr. Co., P.O. Box 1112, Las Cruces, N. M., CA $783,500, JUNIOR HIGH SCHOOL, LAS CRUCES, N. M. Las Cruces School Dist. No. 2, Las Cruces, N. M. CD 1/15, under LB.

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

STREETS AND ROADS

March 8 Utah — March 16, 17, 31, April 7, 14 California

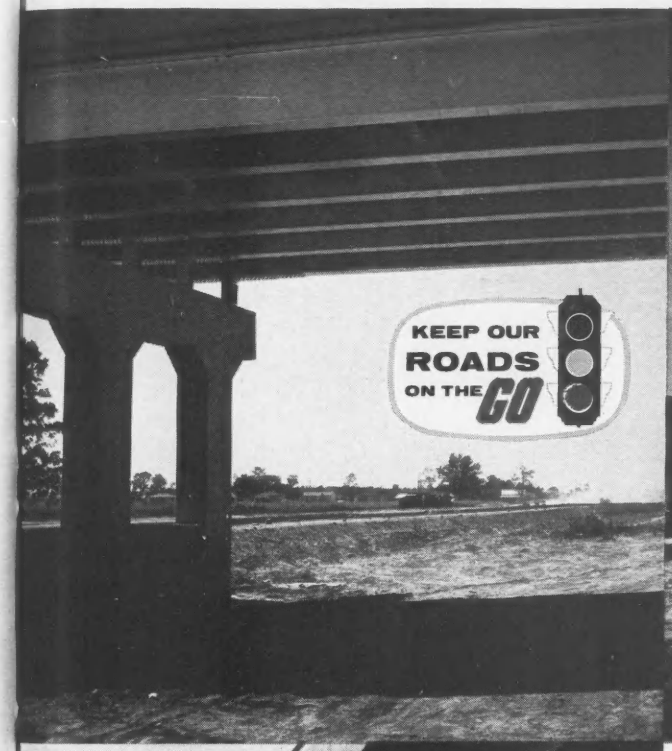
▲† **California**—BA About 3/15—U. S. Eng., 180 N. Montgomery St., San Francisco, widening, deepening channel, Redwood City Harbor, CIVENG-04-203-60-108. $1,500,000. CD 10/1.

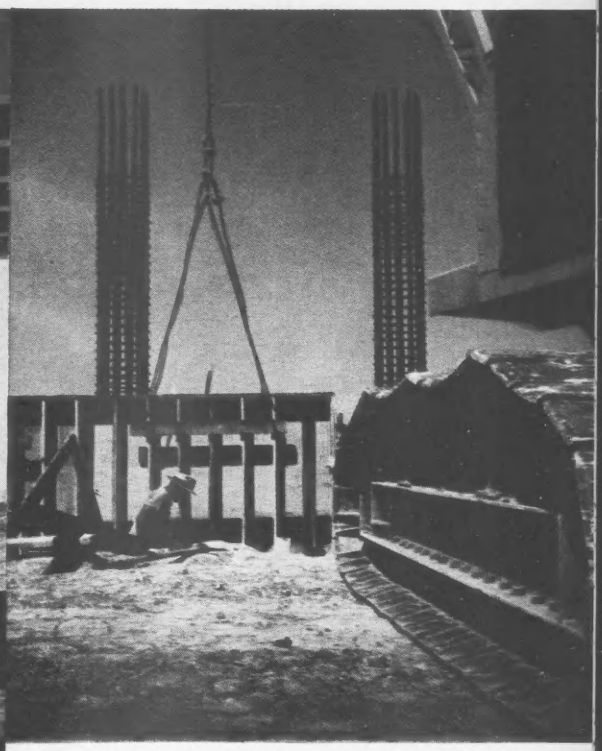
BUILDINGS—BA

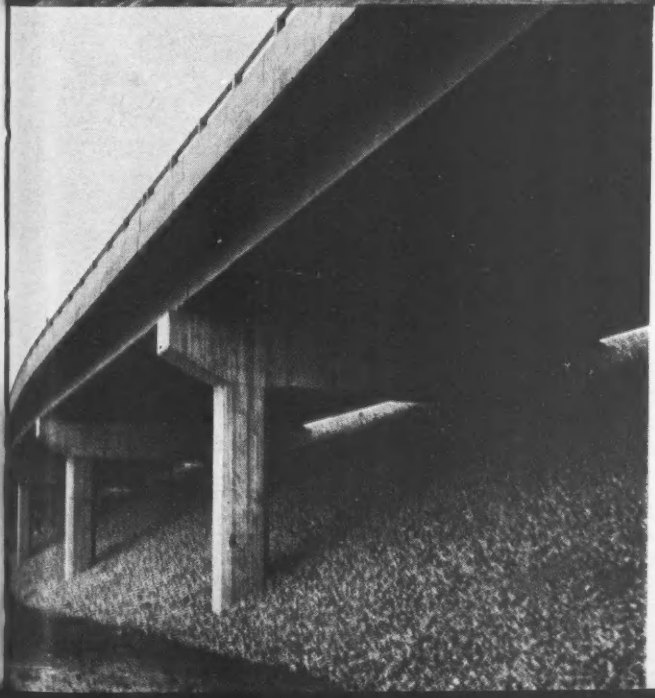
▲ **Wash., Seattle**—BUSINESS ADMIN. BLDG., etc.—BA 3/10—University of Washington, Zone 5, second unit Business Admin. Bldg., incl. 4 story, bsmnt., rein.-con. library and classroom, $1,500,000. Plans deposit $35. Decker & Christenson and P. H. Kirk & Assocs., 1411 4th Ave. Bldg., Zone 1, archts. CD 4/27.

(Continued on page 109)

Indiana builds 1,500 new bridges . . . 1,087 miles of new Interstate Highways







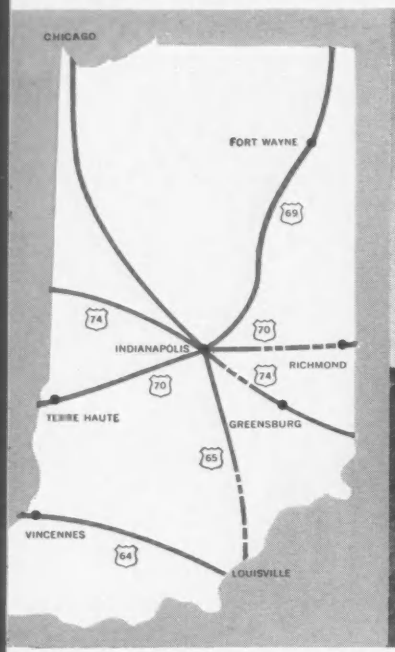
Upper left–USS Structural Steel, shown here in support of the bridge deck, is one of the most economical of all load-carrying materials. It has great strength, permits higher allowable working stresses, and is easily and quickly fabricated in all kinds of weather, substantially reducing construction costs.

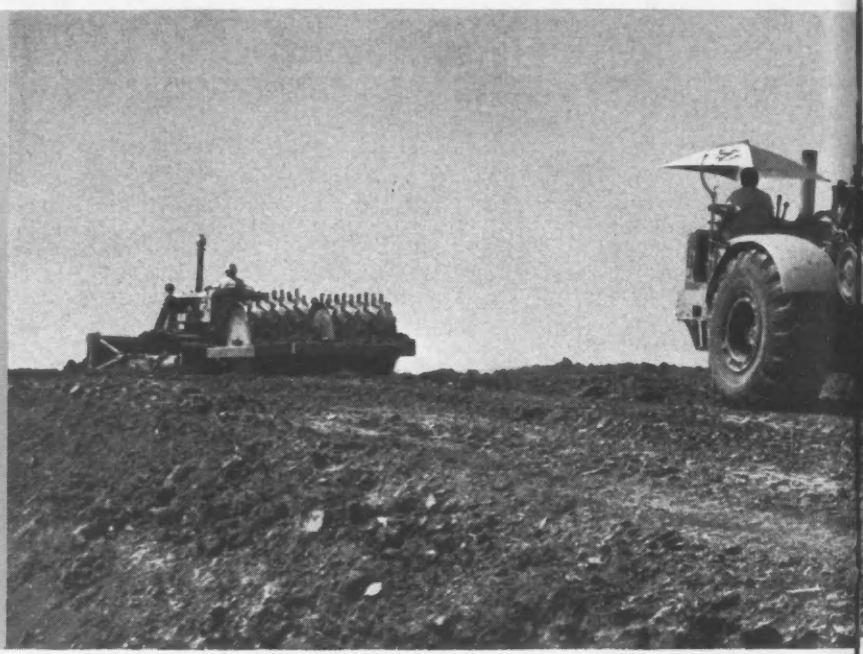
Upper right–Tractor treads take a terrific beating day in and day out. USS Special Rolled Sections are produced to high-quality standards and can stand up to heavy punishment for a long time without replacement, cutting ultimate construction costs. In the background, USS TIGER BRAND Wire Rope lowers a crane load; USS DI-LOK Reinforcing Bars will aid in providing strong, stable support for a new bridge.

Left–More than two million tons of Blast Furnace Slag were used in constructing the western section of the Indiana East-West Toll Road. Air-cooled, crushed-and-screened slag was used as aggregate in the concrete column bents and pavement of this structural steel elevated roadway; and air-cooled, run-of-bank slag was used for erosion control along the banks of the Calumet River.

See inside

Indiana constructs new



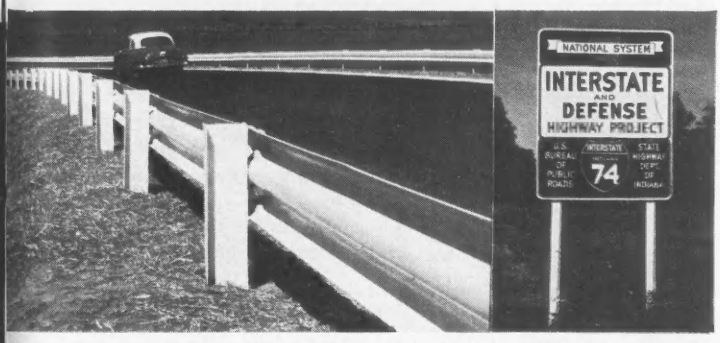


This map shows the general location of Interstate Highways in Indiana. Dotted lines indicate completed highways. Almost all the main routes go into Indianapolis. It has more Interstate Roads leading into it than any other city in the U.S.

Interstate roads and bridges

with help of products from U.S. Steel

Mammoth road-building machines like these must be strong. For strength plus lightweight that increases operating efficiency, strategic parts of this equipment are made with USS High-Strength Steels—USS MAN-TEN and USS TRI-TEN. Control cables are of dependable USS TIGER BRAND Wire Rope.



Highway safety begins with preliminary road design. From a safe, smooth surface (concrete made with UNIVERSAL ATLAS Cement) to strong, long-lasting AmBridge Guard Rail, USS can be your single source of supply. Included in the complete line of USS highway safety products are tubular poles for lights, galvanized steel guard cable, galvanized steel sheets, USS VITRENAMEL enameled sheets for signs, and CYCLONE Fence.

Left—Indiana's many bridges like the one here on Interstate Route 65 are built with a variety of highway products such as: USS Structural Steel, USS DI-LOK Concrete Reinforcing Bars, UNIVERSAL ATLAS Cement. USS Steel H-Piles support piers.

Construction for the Interstate Highway Program is moving rapidly in Indiana. 1,087 miles of Interstate roads and 1,500 bridges are scheduled. Of these, 817 miles of new highways and 103 bridges are under development. More than 165 miles of new roads and 453 new bridges have already been completed or are under construction, not including the Indiana Toll Road. Over $80,575,000 is being spent on the Program this year. The work is under the direction of John Peters, Chairman, Indiana Highway Commission, and G. M. Foster, Executive Director of the Indiana Highway Department.

Many kinds of highway products are needed to build Indiana's roads . . . and U. S. Steel offers a *complete* line of these products: Structural carbon steel, high-strength and constructional alloy steels for bridges; steel H-piles, sheet piling and tubular piles for bridge foundations; drainage products; cements for all types of concrete construction; slag; reinforcing bars and welded wire fabric; wire rope, cable, tubing and special steels for construction equipment; fence, beam and cable guard rail, steel sheets for signs . . . and dozens more.

USS, ATLAS, CYCLONE, DI-LOK, MAN-TEN, TIGER BRAND, TRI-TEN, UNIVERSAL and VITRENAMEL are registered trademarks.

Write for the *free* 54-page booklet, "Keep Our Roads On the Go." You'll find all the United States Steel products and services that will help you cut costs and speed operations in highway construction. United States Steel, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

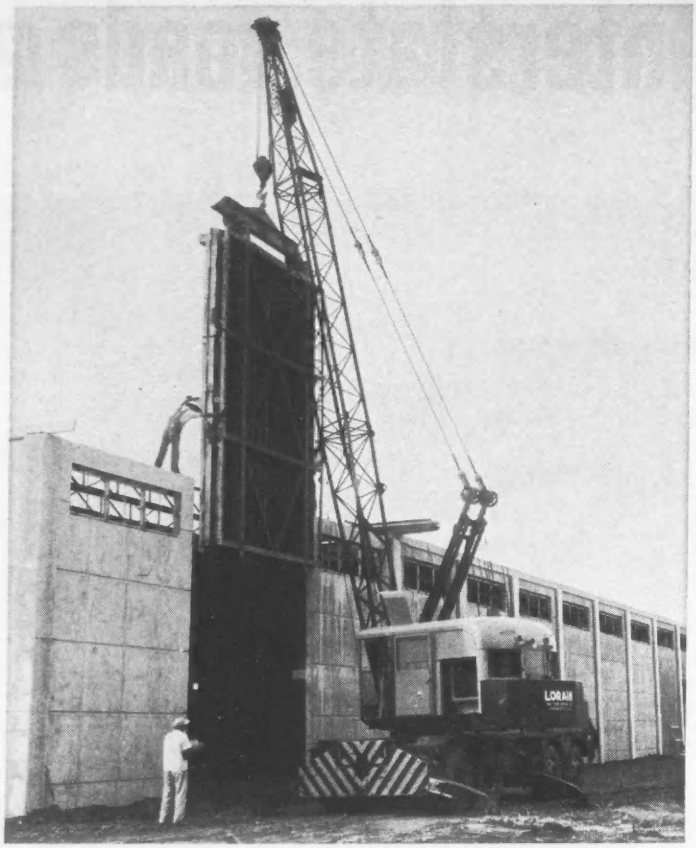
United States Steel

USS

The highway market is served by United States Steel, Pittsburgh, Pa., and the following divisions: American Bridge Division, Pittsburgh, Pa., American Steel & Wire Division and Cyclone Fence Department, Cleveland, Ohio; Columbia-Geneva Steel Division, San Francisco, Calif.; Consolidated Western Steel Division, Los Angeles, Calif.; National Tube Division, Pittsburgh, Pa., Tennessee Coal & Iron Division, Fairfield, Ala.; Universal Atlas Cement Division, New York; United States Steel Supply Division, Steel Service Centers, Chicago, Illinois.

"Tilt-Frame" method used to erect 14 buildings. In a patented process, developed by Garmon Construction Company of Fort Worth, reinforced concrete wall sections are poured into steel frames and put in place less than 24 hours after pouring, cure on the job. Fast, "Power-Set" Outriggers team up perfectly with this fast construction procedure.

Moto-Crane moves up fast as building grows. "Power-Set" Outriggers are partially retracted for ground clearance in 20 seconds. The Moto-Crane moves along for the next lift, and the outriggers are set in another 20 seconds. Maximum capacity and stability for every lift . . . no lost time.



MOTO-CRANE SETS OUTRIGGERS IN 56 SECONDS TO ERECT CONCRETE WALL SECTIONS

"Power-Set"* Outriggers—Lorain's pace-setting development—speed building at Richland Industrial Park in Fort Worth, Texas.

When Gorbett Brothers of Fort Worth, owner of five Lorains, moves in with a 35-ton Lorain Moto-Crane MC-530W to erect reinforced concrete wall sections, the operator can position the "Power-Set" Outriggers in less than a minute. During an 8-hour day this Moto-Crane handles 16 twenty-ton panels. This means many moves a day with a new outrigger set-up each time . . . but it is a breeze with Lorain "Power-Set" Outriggers.

Quick leveling in tight quarters—Each outrigger is independently controlled . . . adjusts to proper spread for working alongside walls. Each adjusts automatically to sloping or uneven ground. Machine is always level.

Positive security with wedge locks—After the four independently controlled and hydraulically powered curved beams move into position, wedge locks automatically take over. No hydraulic pressure is needed to hold outrigger beams in the extended working position.

A Lorain Moto-Crane is the fastest way to get *to* the job. Lorain "Power-Set" Outriggers provide the fastest way to move around *on* the job. See your Lorain distributor today, or write direct for a booklet. *Patented

THE THEW SHOVEL COMPANY, LORAIN, OHIO

LORAIN® ON THE MOVE

PLANTS in Lorain, Elyria and Bucyrus, Ohio . . . **PRODUCTS**—Power shovels, cranes, draglines, clamshells, and hoes on crawler mountings from ⅜- to 2½-yard capacity. Cranes from 7 to 80 tons . . . on crawlers, and as rubber-tire Moto-Cranes, and Self-Propelled Cranes. Rubber tire front-end Moto-Loaders in 1¾- and 2-yard models . . . **OUTLETS**—Lorain products sold and serviced by 249 distributor outlets throughout the world.

(Continued from page 104)

▲ Wash., Pullman—MEN'S RESIDENCE HALLS, etc.—BA 3/11—Washington State University, two men's residence halls and dining hall, $3,000,000. Lea, Pearson & Richards, 240 S. Stadium Way, Tacoma, archts. CD 6/10.

HEAVY CONSTRUCTION—LB & CA

▲† **M-B Constructing Co., Inc.,** Lloyd Bldg., Seattle 1, Wash., LB **$2,859,151,** est. $2,882,394, (3 bidders), Phase 2, Composite Bldg. No. 1, fire station, rearward communication facilities, security fence, passageway extension, etc., for Alaskan Air Command, Inv. 60-23, ALASKA. U. S. Eng., 1519 S. Alaskan Way, Seattle 4, Wash. Bids Feb. 11. CD 1/12.

WASHINGTON—State Hy. Comn., Dpt. Hys., Olympia, **Anderson Bridge Constr. Co.,** 4130 S. Adams, Tacoma, Wash., CA **$756,238,** 1,622 ft., steel truss bridge with rein-con. box girder approach spans over Cowlitz River near Longview, FAP No. F-001-1(31), Cowlitz Co. Bids Feb. 9, awarded Feb. 10. CD 2/12 under LB.

▲ **WASHINGTON**—State Hy. Comn., Dpt. Hys., Olympia, Bids opened 2/16,

Woodworth & Co., 1200 East St., Tacoma, Wash., LB **$1,252,847,** (4 bidders), 2.907 mi. Tacoma Freeway, FAP No. I-5-3(88)130, Pierce Co. CD 1/29.

▲ **Allis-Chalmers Mfg. Co.,** 1126 S. 70 St., Milwaukee, Wis., CA **$2,594,100,** three 40,000 kw. generators for Mayfield powerhouse on Cowlitz River, TACOMA, WASH. City, City Hall, Tacoma, Wash. Bids Jan. 5. CD 1/7, under LB.

▲ **CALIFORNIA**—State Div. Hys., 1120 N St., Sacramento, bids opened 2/11,

Griffith Co., 1060 S. Broadway, Los Angeles, Calif., LB **$8,209,756,** (9 bidders), grading, surf. to provide 4.6 mi. six lane freeway US 101 between Telephone Rd. and Palm St. through Ventura, incl. 10 structures, VEN-2-C, VEN; Ventura Co. 12/30.

Dorfman Constr. Co., 124 N. La Brea Ave., Los Angeles, Calif., LB **$754,676,** est. $350,000, (11 bidders), Los Alamitos Sub-Trunk Sewer, Los Alamitos, SANTA ANA, CALIF. Orange County Sanitation Dist. No. 3, 1104 W. 8th St., Los Angeles, Calif. Bids Feb. 10. CD 1/28.

BUILDINGS—LB & CA

Harwick Constr. Co., 1101 Somerset Lane, Newport Beach, Calif., LB **$878,488,** (9 bidders), Walker JUNIOR HIGH SCHOOL addns., 8132 Walker St., Buena Park, ANAHEIM, CALIF. Anaheim Union High School Dist., 123 Citron Ave., Anaheim, Calif. Bids Feb. 11. CD 1/25.

▲ **L. M. Haldar Co.,** 739 N. Highland Ave., Los Angeles, Calif., CA **$1,080,000,** 103,200 sq. ft. DEPARTMENT STORE, 15120 S. Luitweiler Ave., LA MIRADA, CALIF. LaMirada Business Property, Inc., c/o Welton & Becket & Assocs., archts., 5657 Wilshire Blvd., Los Angeles, Calif.

▲ **La Moine, Inc.,** 15630 Crenshaw Blvd., Gardena, Calif., Owner Builds, **$1,396,400,** 97 DWELLINGS, Hacienda Blvd., Del Prado Dr., La Belle Dr., Corcia Dr., Leticia Dr., Lamoine St., Adelita Dr., Tract 21671, LA PUENTE, CALIF.

Highland Land Co., 2639 S. La Cienega, Los Angeles, 34, Calif., CA **$990,000,** 55 stucco DWELLINGS, Cherry Hills Dr. and Broadmoor Dr., PALM SPRINGS, CALIF. San Gabriel Constr. Co., 2639 S. LaCienega, Los Angeles, Calif.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
STREETS AND ROADS
March 16 Ontario

HEAVY CONSTRUCTION—LB & CA

▲ **Syndicate Perini, Ltd.,** 49 Jackes Ave., Toronto, Ont. (Johnson-Kiewit Subway Corp., and Peter Kiewit Sons of Canada, Ltd., 1587 West 8 St., Vancouver, B. C.), LB **$8,268,721,** with Alternate Bid for prebored pile method at **$8,334,708,** (6 bidders), Contr. U-1, 2,900 ft. University Ave. subway, 2 finished stations and garage, TORONTO, ONT. Toronto Transit Comn., 1900 Yonge St., Toronto, Ont. Bids Feb. 15. CD 2/3.

BUILDINGS—LB & CA

Boreal Constr. Co., 145 Stewart St., Ottawa, Ont., LB **$852,936,** (5 bidders) SCHOOL, Promenade du lac des Frees, HULL, QUE. Catholic School Comn., Hull, Que. Bids Feb. 10. CD 1/29.

LATIN AMERICA

BUILDINGS—BA

▲ **Argentina, Buenos Aires**—HOTEL—BA 3/21—Direccion Nacional de Turismo, Hotel International, Buenos Aires, International hotel on government property in Palermo Section. CD 4/8.

FOREIGN

HEAVY CONSTRUCTION—BA

▲ **Iran**—BA 3/7—Independent Irrigation Dpt., 1 Ave. Farvadin, Tehran, plant to convert sea water to potable water, and power plant, water plant capacity of 500,000 imperial gallons in 24 hrs. and power plant capacity of 2,500 kw., east of Bander Abbas.

BUILDINGS—BA

▲ **Morocco, Fez**—COTTON SPINNING MILL—BA 4/1—Govt. Development Office, Bureau d'Etudes et de Participation Industrielles 8, rue Michaux-Bellaire, Rabat, cotton thread spinning mill. $1,200,000.

(Proposal Advertisements see pp. 118 to 120)

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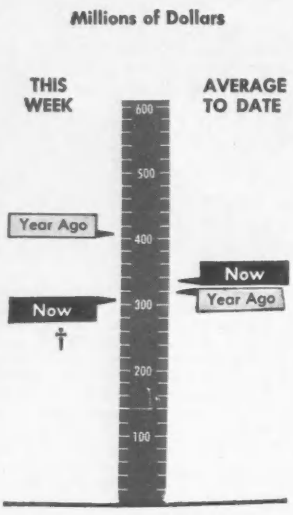
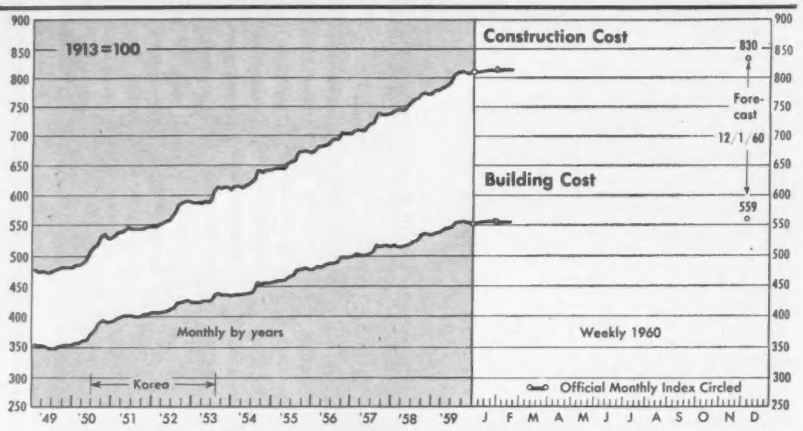
Construction Scoreboard

Contracts...





AMOUNT OF CONTRACTS LET

	This† Week	Cum. 8 wks‡ 1960	Chge '59-'60 %
	millions		
All Heavy Constr.	$307.8	$2,667.3	0
By Ownership			
PRIVATE	202.2	1,450.0	+15
PUBLIC	105.6	1,217.3	−14
State & Municipal	90.1	923.2	− 7
Federal	15.5	294.1	−30
By Type of Work			
PUBLIC			
Waterworks	6.5	41.9	−43
Sewerage	3.4	86.1	+ 3
Bridges*	12.9	101.4	+ 5
Highways	36.0	358.2	− 7
Earthworks, Dams & Waterways	5.6	102.0	+23
Buildings:			
Excl. Housing	28.9	255.2	−34
Housing	2.1	83.3	+13
Unclassified	10.2	190.4	−20
PRIVATE			
Buildings:			
Mass Housing	129.4	685.1	+31
Commercial	22.4	280.8	−17
Industrial	46.1	407.4	+27
Unclassified	4.3	75.5	− 2

*Includes private bridges
‡Revised to include Alaska and Hawaii
†4 day week

NOTE: Minimum size projects included are: Waterworks and waterways, $53,000; other public works, $88,000; industrial buildings, $110,000; other buildings, $400,000.

Capital . . .

New Capital For Construction	Week of Feb. 18	Cum. 7 wks 1960	Chge '59-'60 %
	millions		
Corporate Securities	$104.2	$ 307.2	....
State and Municipal:			
All Except Housing	113.1	1,012.6	+52
Housing	0.2	0.7	....
Federal Loans	1.3	7.2	....
Federal Aid	....	....	....
Total Nonfederal	$218.8	$1,327.7	+15
Federal Appropriations:			
Projects in U. S.	....	....	....
Outside U. S.	....	....	....
Total New Capital	$218.8	$1,327.7	+15

Current ENR Cost Indexes

ENR INDEXES (1913=100), 20-cities' average	Week of Feb. 18 1960	% Change from Jan. 21 1960	% Change from Feb. 19 1959
Construction Cost	812.68	−0.07	+4.09
Building Cost	555.18	−0.09	+2.86

To convert above indexes to 1926 = 100: Divide Construction Cost by 2.080; Building Cost by 1.850.
1949 = 100: Divide Construction Cost by 4.770; Building Cost by 3.518.

BACKLOG OF PROPOSED HEAVY CONSTRUCTION

	January 1960 (millions)	Percent Change from last Month	Percent Change from last Year
Total U. S. (50 States)	$118,753	+1.4	+3.5
By Ownership—			
Private	52,020	+0.9	+4.9
State & Municipal	52,356	+1.2	+2.6
Federal	14,397	+0.3	+2.0
By Type of Work—			
Waterworks	2,861	+1.4	+5.6
Sewerage	3,850	+1.1	+6.4
Bridges	3,439	0	+2.2
Highways	12,947	+0.6	−1.3
Earthwork, Dams and Waterways	12,083	+0.1	+1.3
Public Buildings	21,712	+2.2	+5.0
Industrial Buildings	17,226	+0.6	+0.7
Commercial Buildings	24,133	+3.7	+8.2
Unclassified, Private	10,662*	−0.05	+4.6
Unclassified, Public	9,842	−0.1	+1.2

* Includes Private Bridges, $91.0 million.

FLOW OF NEW PROJECTS INTO THE BACKLOG

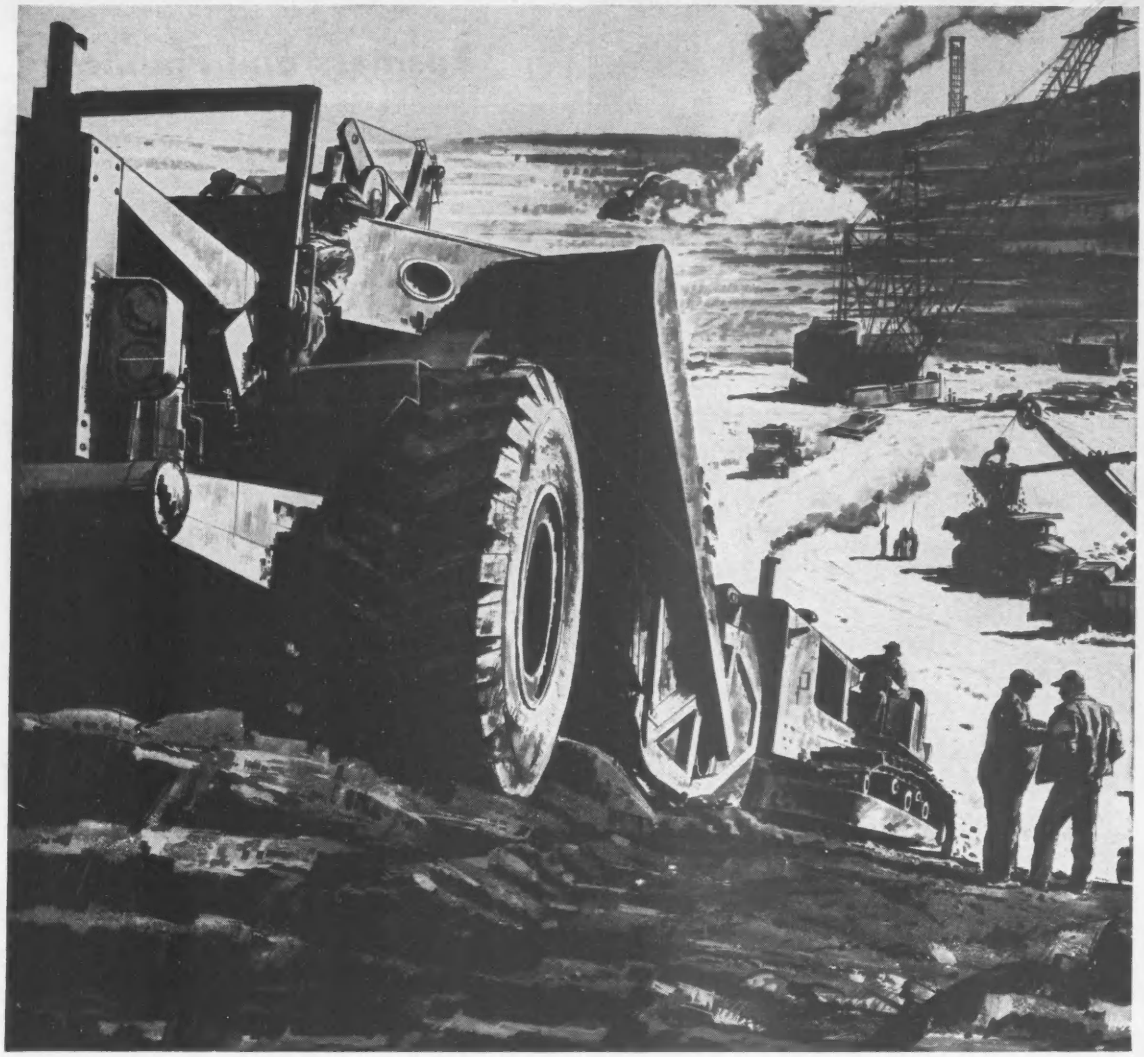
	1960 Jan. (millions)	1960 1-month (millions)	Percent Change (a) from 1959 Jan.	Percent Change (a) from 1959 1-Mo.
Total U. S. (50 States)	$1,614	$1,614	+ 5.8	+ 5.8
By Ownership—				
Private	798	798	+24.0	+24.0
State & Municipal	726	726	− 7.7	− 7.7
Federal	90	90	− 5.7	− 5.7
By Type of Work—				
Waterworks	35	35	−25.0	−25.0
Sewerage	64	64	+ 4.1	+ 4.1
Bridges	43	43	−54.7	−54.7
Highways	60	60	−73.2	−73.2
Earthwork, Dams and Waterways	35	35	−15.4	−15.4
Public Buildings	538	538	+115.8	+115.8
Industrial Buildings	254	254	+85.4	+85.4
Commercial: Mass Housing	222	222	+22.9	+22.9
Other Building	264	264	+37.1	+37.1
Unclassified, Private	58†	58†	−52.6	−52.6
Unclassified, Public	42	42	−75.0	−75.0

† Includes private bridges $0.3 million.

FLOW OF PROJECTS OUT OF BACKLOG INTO CONTRACTS

Total U. S. (50 States)	$668	$668	− 9.2	− 9.2
By Ownership—				
Private	269	269	+11.6	+11.6
State & Municipal	263	263	−20.0	−20.0
Federal	136	136	−17.0	−17.0

(a) Based on average week: 4 weeks in Jan. '60; 5 weeks in Jan.



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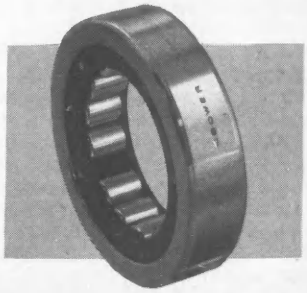
If you produce a product that uses bearings, specify Bower. You will find this extra measure of service in the full Bower line of tapered, cylindrical and journal roller bearings for every field of transportation and industry. Bower Roller Bearing Division, Detroit 14, Michigan.



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J. W. Kesinger, rear, hears the proposal . . .

studies contractor's plans and specs, then . . .

CE Serves Bank as Advisor on

Contractors and land developers seeking construction loans and mortgages from Los Angeles' Security First National Bank now must contend with a "hard-hatted banker."

He's John W. Kesinger, a 50-year-old civil engineer and construction-cost estimator whose technical skills supplement and complement the financial acumen of the bank's executives. He is one of the few civil engineers employed full-time by a bank as a construction expert.

Security First National Bank hired Mr. Kesinger last spring after it consolidated the construction loan activities of 233 branches into a new Interim and Tract Financing Division.

Employing Mr. Kesinger was the logical conclusion to the bank officers' decision that they needed more precise cost estimates when a construction loan was requested and solid construction know-how on their side after construction started.

Mr. Kesinger's experience in cost estimating and construction supervision touched on almost every type of construction venture in which the bank might be involved.

Since graduating from the Missouri School of Mines in 1932, he's made cost analyses for government agencies, major construction companies and petroleum producers. They include the Department of Defense, Atomic Energy Commission, Ralph M. Parson Co., Bechtel Corp., Guy F. Atkinson, Morrison-Knudsen, Kaiser Engineers and Aramco Overseas.

For Aramco he helped compute costs for three American-style towns—schools, stores, houses and hospitals—in Saudi Arabia. Other cost estimating experience took in oil refineries, chemical plants, hydroelectric development, manufacturing plants, a nuclear power installation and military bases.

That's the background he brought to a banking job that may be without precedent.

Basically, the bank wants to protect its funds. When construction is involved, Mr. Kesinger makes sure that the borrower sticks to the terms and conditions of the loan commitment.

"To accomplish this, he must verify cost estimates, double-check engineering features, both as shown in plans and specifications, and as revealed during the progress of construction," says W. M. Scott, vice president of the bank.

Mr. Kesinger's own broad description of his duties is:

"To examine plans, specifications and general layout, consider feasibility and make cost projections—all before the loan is granted by the bank. And, after the loan has been made, inspect the progress of each project, including examination of change orders both in respect to construction and to cost, and on that basis decide on approval of disbursements."

A developer and his contractor come under Mr. Kesinger's scrutiny almost as soon as the building plans are unrolled before a financial officer. If those plans are not technically sound as to cost, design and construction methods, a would-be borrower may face a rejection. So far, however, it has not been necessary for Mr. Kesinger to recommend disapproval of a project loan because of technical inadequacies.

He takes part in discussions of both small and large construction loan applications. The extent of follow-through and on-site inspections varies with the

checks the work in the field for his bank.

Construction Loans

amount of money involved or complexity of the project.

But the owners and contractors can be sure that they will see Mr. Kesinger on the job site sometime, whether it be a relatively small shopping center, or an industrial or commercial complex costing $20 million or more. Currently, he gives much of his attention to a $15-million high-rise apartment building development; a $2.5-million architectural headquarters for Welton Becket & Associates, and a $4-million missile warehouse for Convair Division, General Dynamics Corp.

He makes site inspections before each disbursement of progress payments. Frequency of additional inspections is left to Mr. Kesinger. He generally gets to large projects every two weeks.

Housing-tract financing requires relatively little on-site analysis. A builder of a 500-unit development, for example, may have a maximum of 10 basic floor plans and elevations. Often he will apply for a loan just to construct the models. When he applies later for the much larger loan he needs to complete the tract, a physical product is available for inspection by the bank.

Mr. Kesinger checks housing estimates against a unit cost file he constantly up-dates. He first makes a rough estimate on a square footage basis and then breaks costs down in terms of cubic yards of foundations or slab, board-feet of framing, number of electrical outlets and square feet of glazing and interior finish.

He hopes eventually to be able to give the information to the bank's electronic data processing equipment and get an almost instantaneous cost estimate for a housing development.

Even though Mr. Kesinger acts as a protector of the bank's interest, both he and the institution consider they are providing a new and valuable service. The would-be borrower may be protected from embarking on a venture that is potentially a failure. And the man who gets a loan actually has an outside consultant and field representative working for him at no cost.

Admittedly, there are some who are not in full agreement on those points. "Big Brother" stigma has sometimes been attached to Mr. Kesinger's role as guardian of the bank's security in the construction field.

But, if he has caused some architects and contractors occasional uneasiness, he has more often earned their gratitude and that of the owner.

During one site inspection, Mr. Kesinger spotted inferior foundation work—inadequate bracing, misalignment, improperly tied steel, exposure of horizontal and vertical reinforcing bars after forms were stripped, and excessive voids.

The contractor screamed, but when the owner's consulting engineer confirmed the findings the contractor core-drilled. The cores revealed the voids and the contractor rebuilt about 75% of the foundation.

At another project there was an unexplained slowdown. A site-check by Mr. Kesinger produced the answer. The owner had ignored force reports and was therefore unaware that construction was being delayed by a lack of plasterers. The crew was promptly increased to 22 from five and the job returned to schedule.

The bank also receives a good education in "construction unpredictables." The industry is full of them, but Mr. Kesinger computes what portion of a loan should be set aside as a cushion against "contingencies."

He is even now proving the point that "it's the little things that can go wrong and set off a chain reaction."

During the design of one building now under way, there had been a lapse in coordination between the mechanical and electrical departments. One sprinkler head wound up in the same place where a 4-ft-dia lighting fixture was to be installed. To conform to building codes and appearance, the error called for juggling of either all sprinkler heads and their piping or all lighting fixtures and their wiring. That will result in a modification of the air conditioning system and ducts, which in turn will call for changes in the supporting grid for the suspended ceilings.

Because borrowers generally react defensively when they know their plans are to undergo inspection by a construction man, Mr. Kesinger meets some difficulty in obtaining their full cooperation.

He now urges borrowers applying for construction loans also to supply the plans of the unsuccessful bidders, as well as those of the winner.

Mr. Kesinger believes that when there is a significant difference between the low bid and the next two or three low bids, the reason should be determined by analysis. Sometimes a comparison will show that the low bidder left out a number of items that might increase value far beyond the amount of cash savings involved.

That's service to both owner and bank. And it takes an engineer-banker to prove it.

Indictments Hit Electrical Firms

- **U. S. says 14 equipment manufacturers conspired to rig bids, fix prices of power components.**
- **Turbine, transformer and generator pricing methods may be scrutinized next.**

The U. S. government last week jumped on the pricing practices of the electrical equipment industry with one of the most thorough and hard-hitting antitrust campaigns launched against a single industry.

Seven criminal indictments charging conspiracy were returned against 14 companies and 18 of their employees by a federal grand jury in Philadelphia. Equipment covered includes, power switchgear assemblies, oil and air circuit breakers, low voltage circuit breakers, bushings, insulators, open fuse cutouts and lightning arresters. The Justice Department estimates that sales of the products covered by the indictments total about $265 million a year.

Last week's indictments are believed to be only a beginning. At least two new grand juries are reported at work in Philadelphia on other products. Justice Department officials will not comment, however.

Steam turbines, transformers and generators may eventually show up in the investigations.

The roster of companies indicted reads like a stock broker's list of blue chip recommendations: Allis-Chalmers Manufacturing Co.; General Electric Co.; Westinghouse Electric Co.; I-T-E Circuit Breaker Co.; McGraw Edison Co.; Federal Pacific Electric Co.

Also, Lapp Insulator Co., Inc.; Ohio Brass Co.; H. K. Porter Co., Inc.; Hubbard & Co.; Joslyn Manufacturing and Supply Co.; Porcelain Insulator Corp.; A. B. Chance Co., and Southern States Equipment Co.

The complaints listed more than two solid pages of typical customers affected by the alleged conspiracies—TVA, U. S. Interior Department, Army Corps of Engineers, Power Authority of the State of New York, and a long list of cities and private manufacturing industries.

Depending upon the outcome in court, all are exposed to a multitude of triple damage suits by cities, states and private companies. And under a 1955 federal law, the federal government could sue to recover actual damages suffered, as measured by the difference between the prices paid and what would have been a reasonable market price if no conspiracy had existed.

Although the specific acts and details vary slightly in each case, the companies in general are charged with conspiring to:

- Fix prices and conditions of sale.
- Allocate among themselves the business of supplying federal, state and local government agencies.
- Submit noncompetitive, collusive and rigged bids for electric utilities, federal, state, and local government agencies and private industrial corporations and contractors throughout the U. S.
- Refrain from selling certain types of components bought by other equipment manufacturers who sell in competition with the defendant companies so as to eliminate competition from them.

All of the cases may not yet be filed. The antitrusters referred to the first group of cases as just "part in a series of proceedings." Other cases probably will be filed between now and spring as the Justice Department winds up its broad grand jury investigation of all phases of the heavy electrical equipment industry.

Government lawyers say they have direct evidence against the companies. This was something they didn't have when Justice brought charges against 29 oil companies and Salk vaccine producers. Because evidence was circumstantial, any doubts had to be resolved in favor of the defendants.

In the electrical equipment case, the government gives names, dates, meeting places, code names and secret formulas.

The pattern is revealed in the indictments against GE, Westinghouse, Allis-Chalmers, I-T-E Circuit Breaker, Federal Pacific Electric Co., and 13 officials on power switchgear assemblies. This indictment involves the largest dollar volume product so far—$125 million a year.

The government, in its switchgear assemblies case, says in part:

"Since at least January 1956 until December 1956, representatives of four of the companies met in various cities and allocated among themselves sales of power switchgear assemblies to federal, state and local agencies under sealed bid invitations. The allocation gave each manufacturer an agreed upon percentage of the total sealed bids as follows: GE, 42%; Westinghouse, 38%; Allis-Chalmers, 11%, and I-T-E, 9%."

It then described the method used to effect the alleged allocations, and identified some of the operations as having the code "phase of the moon," or "light of the moon" formula.

ENR Construction Backlog Hits Record $119 Billion

New jobs pouring into the planning stage push ENR's Backlog of Proposed Heavy Construction to the unprecedented height of $119 billion. This fast inflow improves the odds that construction contracts for 1960 will show a gain over last year of at least 7%, as predicted (ENR Jan. 28, p. 55).

New projects entering the planning stage in January had a total estimated construction cost of $1.6 billion, 11% more than in December and 6% more than January 1959 on a weekly average basis. (January 1960 had four weeks; January and December 1959, each had five weeks.)

Proposed state and local public works projects flowed into the backlog in sharply increased volume last month compared with December. These projects had an estimated cost of $726 million. Federal work perked up, even though it was seasonally low at $90 million.

Private heavy construction jobs entered the planning stage in reduced volume compared with December. However, volume topped the year-ago rate by 24%. The decline mainly reflects reduced plans for mass housing, possibly an indication that homebuilders last month were inclined to start new projects immediately, rather than wait for plans to be completed.

Commercial building plans in January topped December and year-ago rates by a wide margin. Industrial building plans dipped, however, from the high volume of November-December 1959. But they were still far greater than January of last year.

Flow out of backlog into contract slowed in January to $668 million, lowest for a January since 1954. A slow start in highway awards and slowness in waterworks are mainly to blame.

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Who Will Man Tomorrow's Jobs?

- **U. S. Labor Department studies depict the 1960s as the era of a mad scramble for skilled and competent workers.**
- **Construction industry will have to find over 2 million additional workers. It is fighting a losing battle at its present pace.**

Employers in the construction industry may be scraping the bottom of the barrel 10 years from now in an effort to get enough construction workers to keep their jobs moving.

In a new report called "Manpower: Challenge of the 1960's," the U. S. Department of Labor paints a picture of grim competition for workers in the decade ahead. Discrimination in hiring will have to go by the boards, it says, and training programs will have to be pepped up and revamped. Contractors will be forced to step up the efficiency of their operations and quality workers will be in stronger demand.

Springboard for the department's theme, "business—but not as usual," is the assumption that the nation's present rate of economic growth will continue. Our manpower potential and improvements in technology, it says, will enable us to increase our output of goods and services by 50% over the next 10 years, pushing the Gross National Product to $750 billion by 1970.

Total employment will rise about 20% and the demand for construction workers will increase by twice that amount.

Trouble from the manpower point of view, the department warns, is that we will have to meet a vast increase in job opportunities with a work force of a different cut from the one we've known in the past.

As the nation's population moves to an estimated 208 million in 1970, a larger number of new workers will be dumped into the labor force than in any previous decade in our history—but with these rather startling results:

- The percentage of young workers will increase, and workers under 25 will account for nearly half the labor force growth.
- The percentage of older workers (45 and over) will also increase.
- The increase among workers 25 to 34 will be relatively small.
- Number of workers 35 to 44 will actually decrease.
- Number of women workers will increase at nearly twice the rate for men. By 1970, one out of every three workers in an estimated labor force of 87 million will be a woman.
- While the new, young workers will have more education than those of the past, the better educated workers are apt to be siphoned off by industries that are demanding rapidly increasing numbers of professional, technical, scientific and clerical workers. Some 10 million of the new workers will not have had a high school education.
- Negro and farm populations will become important manpower sources.

This changing picture in the labor force, the Labor Department notes, means a number of things to employers.

It means they will have to hire a larger proportion of young and inexperienced persons, provide more and better training, improve their supervision, promote safety as a conservation measure, and allow for more part-time workers.

They will have to abandon race, sex age discrimination in hiring, do a better job of matching worker talents to jobs, and develop full use of higher quality manpower.

For the construction industry, the task ahead is a big one.

The Labor Department, in a separate study issued earlier, estimates that the volume of construction activity will increase 40 to 50% over the next decade, calling for a work force of 4.2 million—which is 1.2 million more than we have today.

Add to this the number of craftsmen needed to replace those who die, retire or move to other industries, and we are faced with a need for 2.3 million new construction workers by 1970, according to the department.

Unless the construction industry gets its apprenticeship program out of the doldrums, only about 10% of these additional workers will be provided through apprenticeship.

None of the trades, except carpenters and glaziers, are training apprentices fast enough even to meet depletions by death and retirement, the department reports.

The electrical workers and their employers, for example, have the best apprenticeship record from the point of view of numerical achievement. But if their training continues at present levels, they will fall short of meeting their 1970 manpower needs by 64%. Painters and asbestos workers will be out in left field with shortages of 97%.

The scramble for jobs and for workers will also demand an increasing amount of journeymen training, according to the Labor Department study, and the problem of managerial training in the construction industry will become especially urgent.

The Labor Department's advice is simple: Increase apprenticeship and training—make it substantial and do it now.

Specifically, the department suggests more joint apprenticeship committees, better financing programs, more cooperation from contractors, better selection of applicants and improved on-the-job and related classroom instruction.

Meany Seeks End of Negro Ban

Cites contractor violation of law on a Washington job and criticizes Nixon committee handling of the issue

AFL-CIO President George Meany stirred the muddy waters of the Mountain-Pacific and Brown-Olds cases last week by criticizing the Nixon Committee on Government Contracts for failing to enforce the ban on racial discrimination in federal construction work.

Although the criticism may have some interesting political implications, its significance lies in the fact that it gives contractors a lesson in contract

law and illegel hiring practices, and indicates how the union shop can boomerang on local unions that adopt a racial ban.

During the closing hours of the midwinter meeting of the AFL-CIO Executive Council in Miami Beach, Mr. Meany said he had offered to recruit nonunion, Negro electrical workers for an urban redevelopment project in Washington, D. C., if the committee would force the electrical contractor on the job to obey the law and hire Negroes.

He said he made the offer after the federation and the International Brotherhood of Electrical Workers failed to get IBEW Local 26, which was on the job, to drop its ban against Negro members.

A committee spokesman later said he could find no record of Mr. Meany's offer.

Mr. Meany explained that under the terms of the construction contract, the contractor was forbidden to engage in racial discrimination in its hiring practices regardless of the local union stand. He claimed no Negroes were hired, although qualified ones were available, for two reasons: "The union refuses to admit Negro members and the contractor refused to hire Negroes."

This is one of two construction cases that illustrates the vagaries of law. It helps explain President Eisenhower's 1953 Executive Order against discrimination and sheds some light on the activities of the watch-dog committee set up to police the order. The other case involves the work done by Philadelphia contractor McCloskey & Co., on the east front of the national Capitol, where discrimination against Negro workers is alleged to have occurred (ENR Dec. 3, 1959, p. 21).

Both cases came before the Nixon committee with fewer results than the law requires. The committee's top brass consists of two men for whom Negro votes could become significant in the 1960 elections, Vice President Richard Nixon and Labor Secretary James P. Mitchell. Mr. Meany and Walter Reuther are among the public members of the committee.

Mr. Meany said he hasn't heard a word on his offer since he made it. He accused the contractor of violating the law, as well as the contract, and of hiding behind the skirts of the union's restrictive practices. He accused the Nixon committee of condoning the violation by taking no action against the contractor.

Although the Nixon committee has set up a system for the receipt and investigation of complaints of violation, it has relied during the six years of its operation on moral persuasion for compliance with the order.

Under the order and a 1954 supplement, all contracts let by U. S. contracting agencies must contain a clause, which is required to be carried over into subcontracts, by which the contractor "agrees not to discriminate against any employee or applicant for employment because of race, religion, color or national origin."

The provision applies to employment, upgrading, demotion, transfers, recruitment, layoffs, terminations, rates of pay and selection for apprentice training.

Primary responsibility for compliance lies with the contracting agency. Any person who thinks a violation has occurred can ask the Nixon committee to investigate.

Contractor violation of the clause is automatically a breach of contract punishable under civil law and is a violation of the Executive Order.

When tied into closed shop situations and union referrals, employer rejection of qualified Negroes runs the risk of an unfair labor practice charge under the Taft-Hartley Act and of the application of the Mountain-Pacific doctrine and the Brown-Olds punitive remedy.

It is a violation of federal labor law for an employer to deny employment to a qualified applicant simply because the union objects to him or refuses to refer him.

As Mr. Meany indicated, a union ban on Negoes is no defense for the contractor or the union. And present law would require a union that has a union shop clause to suspend the clause with respect to Negroes hired or to admit the Negro to membership despite the race ban.

Implication of the Meany criticism is that existing law, if enforced, is sufficiently effective to make a race ban ineffective and that the Nixon committee could make the Executive Order work if it really wanted to.

Congress: Labor Issues Shape Up

Two pieces of labor legislation, bills for removing the Taft-Hartley ban from on-site construction picketing and increasing the minimum wage, are blossoming into major issues. The House Labor Committee has received requests from thousands of individuals and businesses to testify on these matters.

The minimum wage shapes up as one of the really big issues this session, because of presidential politics. Hearings were scheduled to be held on the issue last week. But the committee was forced to put the hearings off until next month to accommodate the tremendous number of persons who want to be heard.

The same goes for on-site picketing legislation. Hearings were originally hoped to be concluded in several days on the subject, but they have been stretched out for two weeks, and are now scheduled to wind up February 29.

A sort of gentlemen's agreement was reached last session that the ban against on-site picketing would be lifted this year in exchange for not tying up the fight over labor reform legislation last year.

But it is obvious that business does not consider itself bound, if it ever did, by any agreement reached between congressional leaders and labor officials. Business opposition to removal of the ban is especially strong.

Despite the solid opposition of business and construction groups, the measure still is given a better than even chance of getting through Congress this year.

Big factor tipping the balance in favor of passage is the Eisenhower Administration's approval for some sort of easing of the boycott regulations for construction.

The minimum wage issue is shaping up as a big scrap. More than 40 bills have already been offered in the House to jump the federal minimum to $1.25 an hour from the present $1 floor and to give overtime pay protection to millions of additional workers.

In the Senate, a labor subcommittee headed by Sen. John F. Kennedy (D., Mass.) last year approved a $1.25 minimum. Senator Kennedy is certain to push the measure through for passage to try to get back in the good graces of labor and advance his presidential ambitions.

The major uncertainty right now is the position of the Administration. Labor Secretary James P. Mitchell, who nourishes ambitions to be Vice President Nixon's running mate in the election, is pressuring President Eisenhower for some raise in the wage.

Advance indications are that the Administration will propose a minimum wage of not less than $1.10 an hour.

Liquidated Damages Approved

Contract provisions that establish liquidated damages for breach of contract will generally be enforced under the principles of law that control the interpretation of contracts.

"A clear pronouncement of these principles of law," says an Ohio court,[1] "is found in the second paragraph of the syllabus in Doan v. Rogan, 79 Ohio St. 372, 87 N.E. 263:

" 'Whether a stipulation providing for liquidated damages for the breach of a contract is to be construed as liquidated damages or as a penalty depends upon the intention of the parties, to be gathered from the entire instrument. While courts will not construe contracts in a way authorizing recovery for liquidated damages simply because the parties have used that term in the agreement, yet, where parties to a contract otherwise valid have in terms provided that the damages of the injured party, by a breach on the part of the other of some particular stipulation, or for a total breach, shall be a certain sum specified as liquidated damages, and it is apparent that damages from such breach would be uncertain as to amount and difficult of proof, and the contract taken as a whole is not so manifestly unreasonable and disproportionate as to justify the conclusion that it does not truly express the intention of the parties, but is consistent with the conclusion that it was their intention that damages in the amount stated should follow such breach, courts should give effect to the will of the parties as so expressed, and enforce that part of the agreement the same as any other.'

"It is our view, the rules of law controlling a construction of the contract involved in this appeal were stated again in a later decision by the Supreme Court in the case of Jones v. Stevens, 112 Ohio St. 43, 146 N.E. 894, where it is stated in the syllabus:

" '1. To determine whether a sum named in a contract is intended as a penalty or as liquidated damages, it is necessary to look to the whole instrument, its subject-matter, the ease or difficulty of measuring the breach in damages, and the amount of the stipulated sum, not only as compared with the value of the subject of the contract, but in proportion to the probable consequences of the breach, and also to the intent of the parties ascertained from the instrument itself in the light of the particular facts surrounding the making and execution of the contract.

" '2. Where the parties have agreed on the amount of damages, ascertained by estimation and adjustment, and have expressed this agreement in clear and unambiguous terms, the amount so fixed should be treated as liquidated damages and not as a penalty, if the damages would be (1) uncertain as to amount and difficult of proof, and if (2) the contract as a whole is not so manifestly unconscionable, unreasonable, and disproportionate in amount as to justify the conclusion that it does not express the true intention of the parties, and if (3) the contract is consistent with the conclusion that it was the intention of the parties that damages in the amount stated should follow the breach'."

(1) Economy Savings & Loan Co. v. Hollington, 152 N.E. 2d 125, Court of Appeals of Ohio, June 24, 1958, and numerous other cases there referred to.

Subcontractors Recover Amounts Due General

A contractor who fails to file required waivers of liens may forfeit his right to balances due under the contract, and the right to the balances may then be acquired by subcontractors and materialmen.

A federal case in Connecticut illustrates the principle:

A contract was entered into for the construction of a dwelling. The contract provided that payments would be made to the contractor on furnishing of waivers of liens by suppliers of materials and subcontractors.

The contractor brought an action to recover a balance allegedly due under the contract.

Subcontractors and suppliers of material had filed mechanics' liens. The government had also filed a claim for unpaid taxes on the part of the contractor. The contractor abandoned the job before completion and the owner completed it at his own expense.

The court[1] denied the contractor a recovery. Since he had not furnished the owner with a waiver of liens as called for by the contract, there was nothing due the contractor to which a government tax lien could attach. The other lieners were granted a proportion of the balance remaining unpaid after the completion of the work in satisfaction of their mechanics' lien.

(1) Lebowitz v. Abdella, 168 F. Supp. 266, U. S. District Court of Conn., Oct. 20, 1958.

OFFICIAL PROPOSALS

Bids: March 16, 1960

Sanitary Sewer System

BOROUGH OF PARAMUS
NEW JERSEY
CONTRACT NO. 1

Sealed proposals will be received by the Borough Clerk or his deputy in the office of the Borough Clerk, Municipal Building, 80 State Highway No. 17, Paramus, New Jersey, on Wednesday, March 16, 1960, until 8:00 p.m. Current Time, at which time and place they will be publicly opened and read.

Copies of the plans and specifications, information for bidders and form of proposal may be obtained at the offices of Malcolm Pirnie Engineers, 25 West 43rd Street, New York 36, New York, or 484 State Highway No. 17, Paramus, New Jersey, upon the deposit of Fifty Dollars ($50.00) for each set, Twenty-Five Dollars ($25.00) of which will be refunded upon return of documents in good condition within ten (10) days after bids have been received.

Each proposal shall be submitted on the standard proposal form and enclosed in a sealed envelope marked on the outside "Sanitary Sewer System, Contract No. 1, Borough of Paramus", submitted at the time and place above specified, accompanied by a certified check made payable to the Borough of Paramus in the amount of Fifty Thousand Dollars ($50,000) as a guarantee that if the contract is awarded to the bidder he will enter into a contract therefor with the Borough of Paramus. No bids will be received by mail or accepted after the hour specified.

The successful bidder will be required to furnish a satisfactory bond to the Borough of Paramus in the full amount of the award. The Mayor and Council reserve the right to waive any informalities in the bids and to reject any or all bids.

BY ORDER OF THE MAYOR AND COUNCIL OF THE BOROUGH OF PARAMUS.

HARVEY W. HEBBERD
BOROUGH CLERK
BOROUGH OF PARAMUS
NEW JERSEY

Bids: February 29, 1960

Feeder Road Program

NOTICE:
New Postponed Bid Date: February 29, 1960
Original Bid Date: January 14*, 1960

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR
BIDS: JANUARY 14*, 1960
NOTICE TO CONTRACTORS

The Ministry of Public Works of the Republic of El Salvador advises that on January 14,* 1960, bids will be received for the construction of a major portion of the proposed Feeder Road Program of the country. The Specifications, Plans and Contract Documents will be for sale in El Salvador on December 9, 1959.

All Contractors interested in taking part in this bidding are requested to obtain the necessary Documents, Plans and Specifications from the Office of the Proveeder Especifico de Obras Publicas, Edificio Morazan, 8ª C. P., San Salvador, El Salvador, C. A. All requests must be accompanied by a certified check in the amount of One Hundred Sixty Dollars which will not be returned.

MINISTRY OF PUBLIC WORKS
REPUBLIC OF EL SALVADOR,
C. A.

*New Postponed Bid Date: February 29, 1960

Bids: April 24, 1960

Construction of Port of Um Qasr near Basrah

REPUBLIC OF IRAQ
IRAQI PORTS ADMINISTRATION

The closing date for tenders for the above project has been extended to 24th April, 1960.

Director General,
Iraqi Ports Administration,
Basrah.

OFFICIAL PROPOSALS

Bids: March 17, 1960

New York State Road Work

NOTICE TO CONTRACTORS: STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.,—Pursuant to the provisions of the Highway Law, Public Buildings Law, and Article 2, Title 9 of the Public Authorities Law, and special provisions for projects financed with Federal Aid Funds, sealed proposals will be received until ten-thirty o'clock A. M., eastern standard time, on the 17th day of March 1960, by Henry A. Cohen, Director, Bureau of Contracts, 12th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., for the following projects:

County	Contract No.	Name	Miles	Type	Deposit	Estimated Cost of Work
DISTRICT No. 1, G. L. NICKERSON District Engineer, 353 Broadway, Albany 1, New York						
Albany & Schenectady	FITS 60-3	City of Schenectady: Crosstown Connection, FAC 58-26P; Interstate Rte. Conn. 550, Schenectady Crosstown to Thruway, FISH 58-20; NYS Thruway-mohawk Sec. (Interchange 25 Connection) ST 58-2. Proj. U-323(20); I-890-5(15)	2.22 (1.44 Acc.)	Traffic Signs	$2,200 Plans $5	$40,000
DISTRICT No. 2, L. KETCHUM, District Engineer, 109 No. Genesee Street, Utica 1, New York						
Oneida (Rte. 8)	FARC 60-21	Utica-Poland, Pt. 2B, S.H. 5691A Utica-Poland, Pt. 3, S.H. 5597 Proj. S-482(1)	4.13	Asph. Conc. Ty. 1A=4.13 Mi. Widen Reinf. Conc. Slab Br. Span 20'	$35,000 Plans $5	591,000
DISTRICT No. 4, B. F. PERRY, District Engineer, Barge Canal Terminal, Rochester 1, New York						
Monroe	FAC 60-7 FASH 60-2	Rochester City: Innerloop (Front St. to North St.); Rochester Outerloop, (Winton Rd. South-Highland Ave.) Proj. U-1089(13); U-1093(7)	2.74 (2.30 Acc.)	Asph. Conc.=0.79 Mi., Misc. Work=0.10 Mi.; Demol. & Grad.=1.85 Mi., 4 Hwy. Gr. Sepa. & 1 Br. Comp. I-Beams, 7 Spans 371.0'; 1 Span 76.5', 1 Span 86.4', 1 Span 72.1', 2 Spans 136.0'	$225,000 Plans $10	4,132,000
DISTRICT No. 5, E. G. H. YOUNGMANN, District Engineer, State Office Bldg., 65 Court Street, Buffalo 2, New York						
Erie (Rt. 5)	FARC 60-19	Williamsville Village, S.H. 5061 Main Street, Pt. 2, S.H. 87 Proj. F-933(6)	1.23	Asph. Conc.=1.18 Mi. Misc Work=0.05 Mi.	$35,000 Plans $5	629,000
DISTRICT No. 6. JAMES H. THOMAS, District Engineer, State Office Bldg., 30 West Main Street, Hornell, New York						
Allegany (Rte. 19, 408)	FARC 60-18	Friendship-Belmont, S.H. 5341 Belvidere-Transit Bridge-Angelica, S.H. 1260 Proj. F-FG-332(8)	4.63	Asph. Conc.=4.63 Mi. Br. 1 Twin Box Reinf. Conc. 12'x6.2' Br. Over Erie RR & Creek Comp. I-Beam 4 Spans 280.8'	$80,000 Plans $5	1,442,000
DISTRICT No. 7, ROBERT W. SWEET, District Engineer, 444 Van Duzee Street, Watertown, New York						
Clinton (Int. Rt. 87)	FITS 60-2	Int. Rte. 502, Sec. 7B-1 (Salmon River to Rugar St.) FISH 59-2; Sec. 7B-2, (Rugar St. to Cumberland Head Rd.), FISH 58-23, FIC 58-1; Plattsburgh-Keeseville, Pt. 1, S.H. 56 Proj. I-87-1(17)	4.91 (1.89 Acc.)	Traffic Signs	$1,200 Plans $5	21,000
DISTRICT No. 8, KURT G. RAUER, District Engineer, Pleasant Valley Road, Poughkeepsie, New York						
Dutchess (Rt. 199, 82)	FARC 60-20	Amenia-Pine Plains, Pt. 2, S.H. 5628 Lafayette-Pine Plains-Winchell, Pt. 1, S.H. 1313 Proj. F-594(4), F-468(12)	1.08	Asphalt Concrete	$12,000 Plans $5	219,000
Dutchess (Rt. 44)	R.C. 60-24	Washington Hollow-Millbrook S.H. 609 Millbrook Village, S.H. 1114	1.58	Asphalt Concrete	$10,000 Plans $5	186,000
Rockland & Westchester	T.C. 60-1	Broadway-Hastings-Dobbs Ferry-Mt. Pleasant-Tarrytown-N. Tarrytown, S.H. 9206; White Plains-Eastview Rd., S.H. 5571; Spring Valley-Knapps Corners, S.H. 689; Knapps Corners-Nyack, S.H. 5178	—	Traffic Signals	$2,500 Plans $5	45,000
DISTRICT No. 9, JOSEPH C. FEDERICK, District Engineer, 71 Frederick Street, Binghamton, New York						
Delaware (Rte. 206)	FARC 60-23	Walton-Downsville, Pt. 1, S.H. 8515 Walton-Downsville, Pt. 2, S.H. 48-18 Proj. S-44(6)	6.68	Asphalt Concrete	$44,000 Plans $5	804,000
Delaware	BWS 60-1	New York City: Board of Water Supply, Road No. 1 (Cannonsville Reservoir) (Stilesville Bridge)	0.16	Prestress. Conc. Beam Br. 6 Spans, 470.1 Ft.=0.09 Mi. Misc. Work=0.07 Mi.	$24,000 Plans $5	436,000
DISTRICT No. 10, M. E. GOUL, District Engineer, 325 W. Main Street, Babylon, L. I., New York						
Bronx & New York	FICBE 60-2	Interstate Rte. Conn. 511 (Cont. 1A); Cross Bronx Expressway (Alexander Hamilton Br. Substructure) Proj. I-95-1(38)	0.31	Bridge Substructure=0.29 Mi. Misc. Work=0.02 Mi.	$180,000 Plans $5	3,340,000
Kings (Int. Rt. 278)	FIGE 60-2	Int. Rte. Conn. 512 Gowanus Expressway (20th to 36th Streets) Proj. I-278-1(47)	0.82 (0.82 Acc.)	Reinf. Conc. Slab Roadway (on Viaduct)=0.80 Mi.; Misc. Work=0.02 Mi., Sheet Asph. Pavt. (Streets)=0.82 Mi., Alter & Strengthen Elevated Steel Struct. 80 Spans, 4,216'	$700,000 Plans $5	12,347,000
Nassau	FANE 60-1	Nassau Expressway (Cont. 1) Bayview Ave. to Broadway Proj. U-1098(5)	0.45	Demol. of Buildings	$1,000 Plans $5	18,000
Nassau	FAHHE 60-2	Horace Harding Expressway Ext. New York City-Nassau Co. Line to Guinea Woods Road Proj. U-862(26)	—	Roadside Development Access Ramps Delineators & Misc. Work	$15,000 Plans $5	262,000
Nassau & Suffolk	FALIE 60-1	Long Island Expressway (Nassau-Suffolk Co. Line to Pinelawn Rd. Proj. U-862(25)	2.63 (4.61 Acc.)	9" Cem. Conc. 2 @ 36=2.36 Mi., Misc. Work=0.27 Mi. Acc. 2.45 Mi. Conc.; 2.16 Mi. Asph Conc.; 4 Hwy. Gr. Sepa. Comp. St. Em.: 4 Spa. 152.0'; 4 Spa. 236.3'; 4 Spa. 266.2'; 4 Spa. 258.0'	$240,000 Plans $5	4,110,000
Nassau & Suffolk	NSP 60-1 WSP 60-1	Northern State Parkway (N.Y. City Line-Sunken Meadow Spur); Wantagh State Parkway (Northern St. Parkway-Southern St. Parkway)	29.69	Fencing at Various Locations	$15,000 Plans $5	274,000
Suffolk (Rte. 27)	FARC 60-26	Sunrise Highway Extension S.H. No. FASH 58-5; FASH 58-6 Proj. U-947(20); F-947(20)	6.80	Roadside Development	$12,000 Plans $5	209,000

Any projects in this letting that are on the Federal Aid highway systems are subject to the provisions of the "Federal-Aid Highway Act of 1956", being Public Law 627, 84th Congress, approved June 29, 1956, and are also subject to the applicable New York State statutes.

In compliance with the provisions of Section 115 (Prevailing Rate of Wage), Public Law 627, the minimum wages to be paid laborers and mechanics are included in wage schedules that are set out in the bid proposal. Maps, plans, specifications and proposal forms may be seen and obtained at the office of the State Department of Public Works, Bureau of Contracts, Albany, N. Y., and at the office of the District Engineers noted above, and may also be seen at the office of the State Department of Public Works, 270 Broadway, New York City.

The deposit for Plans and Proposal Forms for each contract is indicated above. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "Information for Bidders" in the Public Works Specifications, and to the special provisions applying to projects financed with federal funds. Award of a contract is subject to priorities and allocations under the Defense Production Act of 1950, as Amended, and all regulations issued thereunder.

Proposal for each contract must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check payable to the order of the "State of New York, Commissioner of Taxation and Finance" for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bond shall conform to the provisions of the Highway Laws, as set forth in "Information for Bidders".

The right is reserved to reject any or all bids.

J. BURCH McMORRAN
SUPT. OF PUBLIC WORKS

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5285) will be received at Lewiston, California, until 2 p.m., Pacific Standard Time, March 29, 1960, for furnishing labor and materials for earthwork, structures, and surfacing, relocation of Trinity County Road, Swift Creek to Carrville, Trinity River Division, California, Central Valley Project. Location near Redding, California, in Trinity County. Principal items are excavation 680,000 cu. yds.; crushed rock base 100,000 tons; corrugated metal pipe 4,300 lin. ft.; and other work. Completion time 525 days. For particulars, address Bureau of Reclamation, Post Office Box 247, Lewiston, California, or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

Bids: March 22, 1960

Central Terminal Area Modifications to Master Meters and Chilled Water Meters

THE PORT OF NEW YORK AUTHORITY
NEW YORK INTERNATIONAL AIRPORT
CONTRACT NYA-110.015

Sealed proposals for modifying Hays B.T.U. Integrating Meters and Boiler Flow Meters in Central Terminal Area Buildings at New York International Airport will be received at the office of the Chief Engineer of The Port of New York Authority, Room 1100, 111 Eighth Avenue, New York 11, N. Y., until 2:30 P.M. on Tuesday, March 22, 1960, at which time said proposals will be opened and read in Room 1108.

Contract documents may be seen at the Office of the Assistant Chief Engineer for Design of the Authority, Room 1115. Documents will be furnished upon deposit of $30.00 per set for not more than three sets to any one company (each set including one copy of the contract drawings). Additional sets will be furnished upon payment of $30.00 per set, which payment is not returnable. Deposits and payments shall be delivered to the Treasury Department, Room 1001, where a receipt will be issued. The receipt shall be delivered to Room 1115, where the documents will be furnished.

Those who have submitted a bid on the contract directly to the Authority will receive a refund of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals. Those who have not submitted a bid will receive a refund of one-half of the deposit for each set of documents, not exceeding three, returned within forty days after the opening of proposals.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt, Chairman

New York, February 25, 1960

OFFICIAL PROPOSALS

Bids: March 15, 1960

Construction of Storm Drain & Appurtenances

CITY OF LINDEN, NEW JERSEY
NOTICE TO BIDDERS

Sealed proposals for Construction of Storm Drain and Appurtenances in connection with Contract 4 of Storm Drainage Relief Project—Eighth Ward will be received by the Common Council of the City of Linden, New Jersey, at a meeting to be held in the Council Chamber at the City Hall 8:30 P.M., on March 15, 1960, and then publicly opened and read. No proposal will be accepted after said hour.

The work will include the construction of about 1112 lin. ft. of 120 inch diameter reinforced concrete drain and Appurtenant Structures along the Esso Standard Division of Humble Oil and Refining Company property adjacent to the Staten Island Rapid Transit Railway Company right of way; thence crossing under Staten Island Rapid Transit Railway Company tracks, and along the Simmons Company property adjacent to the Railroad and crossing under Brunswick Avenue and terminating on the westerly side.

Information for Bidders, Proposal Forms, Specimen Contract, Plans Specifications and other pertinent Contract Documents may be examined at the office of the City Engineer, City Hall, Linden, N. J., and at the office of Alexander Potter Associates, Consulting Engineers, 50 Church Street, New York, between the hours of 10 A.M. and 4 P.M., daily except Saturdays and holidays and there obtained upon making a deposit of Twenty-Five ($25.00) dollars. Full refund will be made to actual bidders for return of one set, in good condition within fifteen (15) days. Half of this deposit will be refunded to non-bidders. Extra copies of Specifications may be obtained a a cost of ten ($10.00) dollars each and extra copies of the drawings at a cost of One ($1) dollar each which sums will not be refunded.

BIDS AND BID SECURITY: All bids must be made upon standard proposal forms contained in the bidding documents and must be enclosed in sealed envelopes bearing the name and address of the bidder and a desination of the proposed work on the outside of such envelope addressed to the Council of the City of Linden. Each bid must be accompanied by a certificate of a responsible surety company executed by the bidder and such surety company guaranteeing that the bidder will execute the contract if it is awarded to such bidder and that said surety company will provide the performance bond recited in R.S. 2A:44-147 in the full amount of the contract price.

No bid may be withdrawn for any reason whatsoever after it has been opened and read at the time and place above designated during the period of forty-five (45) days following the public opening and reading of such bid.

In the event the successful bidder shall fail to enter into a contract with the City of Linden or fail to file the required performance bond within ten (10) days after the giving of notice on behalf of the City of Linden to such bidder that the award has been made to said bidder, the City of Linden may award the contract to the next lowest responsible bidder or in its judgment may proceed to re-advertise for new bids and the aforesaid successful bidder and surety company shall be responsible to the City of Linden for all of its expenses, losses and damages by reason of such failure on the part of the bidder and surety, or either of them. Extension of time to enter into the contract and failure to do so after such extension of time shall not in any way effect the rights of the City of Linden against the bidder or surety company.

The Council reserves the right to reject any and all bids as may be deemed to be in the best interest of the City of Linden. The Contractor shall enter into the form of contract contained in the bidding documents, which may be inspected in the office of the City Engineer and the Consulting Engineer, and the same shall include and shall be regarded as including, whether the same is specifically set forth or not, the provisions of R.S.34:10-1 (Chapter 230 P.L.1932) and all state laws and labor regulations relating to municipal contracts.

BY ORDER OF THE MAYOR AND COMMON COUNCIL OF THE CITY OF LINDEN, NEW JERSEY
Francis H. Dann, City Clerk

Dated: February 18, 1960

OFFICIAL PROPOSALS

District of Columbia—Water Construction—Dept. of Sanitary Engineering, D. C., Feb. 11, 1960, CONSTRUCTION OF SOUTHEAST RELIEF WATER MAIN, FIRST SECTION (Part 2), "N" ST., BET. FIRST ST., N.W. AND 3RD ST., N.E., BET. "M" AND "N" STS. (INVITATION NO. C-6067-S), consisting of approximately the following: IN OPEN CUT—2,213 lin. ft. 66" dia.; 65 lin. ft. 48" dia.; and 15 lin. ft. 42" dia. Water main; 145 lin. ft. 8" dia. Water main and Smaller; and 45 lin. ft. 15" dia. Terra Cotta Basin Connection—IN TUNNEL: 1,262 lin. ft. 66" dia. Water main. Bid forms, plans and specifications are now available from Supervisor, Bid and Contract Division, Procurement Office, D. C., Room 404, 499 Pa. Ave., N.W., upon deposit of a certified check for $50.00 per set, payable to D. C. Treasurer. (Phone NA 8-6000, Ext. 2378). SEALED BIDS to be opened 3:00 PM, EST, March 10, 1960, in Rm. 424, 499 Pa. Ave., N.W.

Bids: March 10, 1960

Holland Tunnel Cleaning of Water Mains

THE PORT OF NEW YORK AUTHORITY
CONTRACT O & M 529

Sealed proposals for furnishing all labor, material and equipment for the cleaning of the 6" low pressure water supply system at the Holland Tunnel from the shut off valve at the Jersey City Main in 12th Street adjacent to the toll house to the connection to the two standpipe booster pumps in the New Jersey Land Building, and the 6" high pressure piping system and the 2 - 4" risers in the New Jersey Land Building at the Holland Tunnel will be received at the office of the Department of Purchase and Administrative Services of The Port of New York Authority, Room 900, 111 Eighth Avenue, New York 11, New York until 11:00 A.M. Thursday, March 10, 1960, at which time and place said proposals will be opened and read.

Contract documents may be seen at the office of the Department of Purchase and Administrative Services, Room 900, and copies will be purnished upon deposit of $10.00 per set. Deposit must be delivered to Treasury Department, Room 1001, where a receipt will be issued. The receipt is then to be delivered to the Department of Purchase and Administrative Services, which will furnish the contract documents. The deposit will be remitted if the documents are returned in good condition, not later than thirty days after the opening of proposals. The deposit will be forfeited if the documents are not returned within thirty days.

THE PORT OF NEW YORK AUTHORITY
S. Sloan Colt, Chairman

New York, February 25, 1960

Bids: March 16, 1960

Sanitary Sewer System

BOROUGH OF PARAMUS
NEW JERSEY
CONTRACT NO. 2

Sealed proposals will be received by the Borough Clerk or his deputy in the office of the Borough Clerk, Municipal Building, 80 State Highway No. 17, Paramus, New Jersey, on Wednesday, March 16, 1960, until 8:00 p.m. Current Time, at which time and place they will be publicly opened and read.

Copies of the plans and specifications, information for bidders and form of proposal may be obtained at the offices of Malcolm Pirnie Engineers, 25 West 43rd Street, New York 36, New York, or 484 State Highway No. 17, Paramus, New Jersey, upon the deposit of Fifty Dollars ($50.00) for each set, Twenty-Five Dollars ($25.00) of which will be refunded upon return of documents in good condition within ten (10) days after bids have been received.

Each proposal must be submitted on the standard proposal form and enclosed in a sealed envelope marked on the outside "Sanitary Sewer System, Contract No. 2, Borough of Paramus", submitted at the time and place above specified, accompanied by a certified check made payable to the Borough of Paramus in the amount of Fifty Thousand Dollars ($50,000) as a guarantee that if the contract is awarded to the bidder he will enter into a contract therefor with the Borough of Paramus. No bids will be received by mail or accepted after the hour specified.

The successful bidder will be required to furnish a satisfactory bond to the Borough of Paramus in the full amount of the award. The Mayor and Council reserve the right to waive any informalities in the bids and to reject any or all bids.

BY ORDER OF THE MAYOR AND COUNCIL OF THE BOROUGH OF PARAMUS.

HARVEY W. HEBBERD
BOROUGH CLERK
BOROUGH OF PARAMUS
NEW JERSEY

Bids: March 15, 1960

General Construction of CHA Project Ill. 2-30, Stage I

The Chicago Housing Authority invites properly qualified bidders to submit proposals for all labor and material required to complete the General Construction of CHA Project Ill. 2-30, Stage I. The work includes five (5) 15-story and one (1) 16-story apartment buildings containing a total of 814 dwelling units in the general vicinity of West Division Street, North Ogden Avenue and West Scott Street; and heating plant addition to the existing Boiler Room at 418 West Oak St., and all related utility and site work.

Bids will be received until 2:00 p.m., local time on March 15, 1960, by mail or by hand in Room 1500 of the Chicago Housing Authority, 608 S. Dearborn St., Chicago 5, Ill., immediately after which time and at such place all bids will be publicly opened and read aloud.

Contract documents including plans and specifications may be obtained on or after February 15, 1960, by depositing $75.00 (certified check or money order) with Pace Associates, Architects and Engineers, 53 West Jackson Boulevard, Chicago 4, Ill.

U. S. Government

Sealed bids will be received in the office of the Engineering and Construction Director, Balboa Heights, Canal Zone, until 1:00 PM EST March 21, 1960, and will at that time be publicly opened, for the demolition of an existing timber dock about 305 feet long, construction of a new reinforced concrete dock 460 feet long, supported on 16" concrete filled steel pipe piles, concrete encased railroad track, rubber dock fenders, electrical, water and air utilities, cathodic protection system, and timber pile dolphins at Dock 14, Mount Hope, Canal Zone. Plans and specifications are now available for examination in the Procurement Office, Panama Canal Company, 21 West St., New York 6, N. Y. Complete sets of data may be obtained upon payment of $50.00 refundable deposit for each set. For information contact this office. Telephone BOwling Green 9-5380, Extension 73. Reference PC 60-50.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-5284) will be received at Weslaco, Texas, until 10 a.m., Central Standard Time, March 24, 1960, for furnishing labor and materials for clearing, earthwork, concrete lining, and structures for rehabilitation of C and G Lateral Systems, Mercedes Division, Texas, Lower Rio Grande Rehabilitation Project. Location near Mercedes, Texas, in Hidalgo County. Principal items are constructing embankments 245,000 cu. yds.; concrete in lateral linings 5,700 cu. yds.; and other work. The work is divided into 2 schedules. Completion time 750 days. For particulars, address Bureau of Reclamation, P. O. Box 357, Weslaco, Texas; or Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

READ THE OFFICIAL

PROPOSAL COLUMN OF

ENGINEERING NEWS-RECORD

THIS WEEK AND EVERY WEEK

EMPLOYMENT NATIONAL COVERAGE OPPORTUNITIES

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The advertising rate is $39.20 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

MARCH 10TH ISSUE CLOSES FEBRUARY 29TH

UNDISPLAYED RATE:

$2.40 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take ½ of above rate.

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Discount of 10% if full payment is made in advance for 4 consecutive insertions.

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ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. Box 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

• POSITIONS VACANT

Sales Engineer: To represent expanding prestressed concrete plant in Southeastern Wisconsin area. Structural design background in building field considered helpful. Send complete resume and salary requirements to P-3492, Engineering News-Record.

Assistant to Sanitary Engineer graduate Civil or Sanitary; Military obligation fulfilled, some experience in sewerage desirable; Salary: $5500-$5800; Location: Northeast Lake County, Ohio: Submit Resume. P-3619, Engineering News-Record.

Construction Superintendent, Engineering Background essential, estimating experience helpful. General Contracting organization operating in Middle Atlantic States and dealing primarily in public buildings. Complete resume requested covering education, experience, salary requirements and when available. P-3731, Engineering News-Record.

ENGINEERS AND MATERIALS INSPECTORS WANTED

TVA has openings on a large hydro- and steam-electric program for experienced civil, structural, electrical, and mechanical engineers in its Division of Design located in Knoxville, Tennessee, and for materials engineers and inspectors of materials located in various district offices, principally in the north and east.

These positions are at the following grades and rates of pay:

Civil, Mechanical, Electrical, and Materials Engineers, grades SD-2 and -3 $6200-$7150.

Inspectors of Materials, grades SE-5 and -6 $5825-$6625.

The engineering jobs require a college degree in engineering or its equivalent with from one to three years of experience in design and specification work, or in inspection and testing work for materials engineers. The inspector of materials jobs require some college training in engineering or equivalent training and experience in making engineering inspection and tests of mechanical structural, and electrical equipment and materials.

All jobs carry automatic within-grade increases for satisfactory service, liberal vacation leave, sick leave, and retirement, hospitalization, and insurance benefits.

Write to:

TENNESSEE VALLEY AUTHORITY
Division of Personnel,
Knoxville, Tennessee

ENGINEER for GRAIN COMPANY

Engineering Department of large grain company requires graduate engineer, C.E. or M.E., for permanent position with some experience in construction and design of grain elevators and knowledge of grain handling equipment. Location is New York City. Submit detailed experience record and list of references to

P-3707, Engineering News-Record
Class. Adv. Div., P.O. Box 12, N. Y. 36, N. Y.

• POSITIONS VACANT

Sales Engineer—Civil or equivalent with good sales experience for a large precast wall panel plant. Mail resume to: Midwest Concrete Industries, West Des Moines, Iowa.

City Engineer For Oberlin, Ohio. Graduate civil engineer with minimum two years experience in survey, drafting and general engineering wanted. Salary open. Send resume with application to Mr. Richard J. Dunn, City Manager, City Hall, Oberlin, Ohio.

Structural Designers—Consulting Engineering firm expanding operations in New England. Excellent opportunity for qualified experienced highway bridge designers. Salary open, give full particulars to P-3686, Engineering News-Record.

Civil Engineer—Registered Professional Engineer with experience in municipal street and sewer design. Beginning each year for next three years to final salary after three (3) years of approximately $8814.00, with normal fringe benefits. Submit resume and references to Director of Public Service, City of Middletown, Ohio, P.O. Box 530.

Have opening for recent Civil Engineer Graduate with military obligations completed who desires to learn the construction business. Ambitious, aggressive, dependable, use no intoxicants, willing to start in the field on industrial building and heavy construction, and willing to move. Must be single. We operate throughout Kansas and adjacent states; offer excellent opportunity for advancement. Martin K. Eby Construction Company, Inc. P. O. Box 1679, Wichita, Kansas.

Superintendent Wanted. Must have knowledge and experience in operation of pulverizing equipment. Four year job Arizona. In first letter state experience, qualifications, expected earnings and references. P-3785, Engineering News-Record.

Wanted: Deputy Director for Department of Public Improvement, Division of Waters and Sewers. Must have training and experience in the field of Sanitary Engineering and experience in Municipal Administration, and must be thoroughly familiar with engineering problems in the field of public works improvement. Apply Savannah Civil Service System, 8 East Bay Street, Savannah, Georgia.

Assistant Engineer—City of Little Falls, N. Y. Salary Range $4,720 to $5,660. Capable of performing engineering duties in connection with municipal public works program. Civil Service examination to be held April 30, 1960. Last date for filing March 30, 1960. Applications and information may be obtained from Margaret M. Nolan, Secretary, Municipal Civil Service Commission, City Engineer's Office, Little Falls, N. Y.

Shoring Sales Engineer, with experience in the rental and sale of concrete shoring equipment to manage Chicago metropolitan operation. Salary and commission. Confidential interview. Send resume to: P-3779, Engineering News-Record.

Firm located Metropolitan-NY area seeking $20,000,000.00 volume construction administrator. Wanted: General construction graduate engineer experienced in competitive government construction. Must cover estimating, purchasing, supervision and direct contact with government agencies. Aggressive. Must have previous experience in similar position with firm that is doing 5 to 10 million dollars plus a year. Starting salary $20,000 plus incentive. Complete resume requested. All replies confidential. P-3748, Engineering News-Record.

• POSITIONS VACANT

Young Civil Engineer to handle technical phases of producing concrete for a Ready Mix Dealer and Paving Contractor. Furnish resume.. Kirby, P. O. Box 560, Champaign, Illinois.

• EMPLOYMENT SERVICE

Better Positions—$6,000 to $35,000. Want a substantial salary increase, more opportunity or different location? This national 49 year old service connects you with best openings. You pay us only nominal fee for negotiations: This we refund when employer pays placement fee. Present position protected. In complete confidence, write for particulars. R. W. Bixby, Inc., 559 Brisbane Bldg., Buffalo, N. Y.

• POSITIONS WANTED

Construction Executive, age 36. Prefer equipment maintenance division of heavy construction firm. Experienced in labor relations, cost control, purchasing of machinery and parts inventory, rail and truck transportation, repair shop management and prevention maintenance on all types of construction equipment. PW-3692, Engineering News-Record.

Architect, American, in Europe, licensed N. Y., N. J. 25 years experience, six years in Europe as Chief Architect, seeks new position. A. Hofmann, 5 Vieux College, Geneva, Switz.

Construction Executive-C.E., experience covers office and field management, estimating, cost analysis, coordinating, expediting, in Highway and Bridge Construction. State position, location, salary. PW-3721, Engineering News-Record.

Executive Age 43 Construction Manager 25 yrs. experience Highway Airport Sewers Large Industrial Installations. U.S.A. or Foreign. PW-3390, Engineering News-Record.

Project Manager, Gen'l Supt., CE Degree 20 years experience. Proven record, cost minded, bidding to completion, Hi-ways, Sewers, Water, Commercial, Industrial, Sub-divn, Shopping center development, Available at once, Min. Salary $11,000. Prefer Ohio, Indiana, Illinois location. PW-3723, Engineering News-Record.

Superintendent-Estimator-Engineer, CE P.E. L.S. (N. J.) experienced public works, utilities, bridges, paving, desires position general contractor or municipality, N. J. PW-3734, Engineering News-Record.

Project Manager or General Superintendent, field supervision and general management. Thoroughly experienced industrial, commercial and institutional projects in U. S. and O. S. Now employed available 90 days. PW-3662, Engineering News-Record.

Professor, struct. or civil, 20 yrs. teaching, research, and industrial experience, Ph.D. PW-3615, Engineering News-Record.

Supt. Const., 20 yrs. Institutional, Commercial, Industrial. Engineer. PW-3621, Engineering News-Record.

Project Manager—Estimator, twenty years with one company. Field and management experience in heavy and industrial construction. PW-3661, Engineering News-Record.

Estimator—Chief Engineer: With experience in both field and office on all types of work, invites replies from progressive Heavy Construction Contractors. PW-3602, Engineering News-Record.

(Continued on page 123)

DEPRECIATION ENGINEER

A graduate engineer with experience in the gas or electric utility fields, with ability to apply generally accepted theories and methods for determining depreciation rates and reserves, is being sought by a major engineering-consulting firm. Under rules of taxation applicable to electric and gas utilities, he will be responsible for:

Determining depreciation allowances based on estimated useful lives and salvage; developing and applying mortality curves to mass property accounts as a statistical means of identification of property; developing statistical studies to measure reasonableness of reserves for depreciation.

Please send complete confidential resume to:

P-3656, ENGINEERING NEWS-RECORD
Class. Adv. Div., P.O. Box 12, N. Y. 36, N. Y.

LABORATORY ENGINEER

FOREIGN ASSIGNMENT

on

Multi-Purpose Dam Project in Thailand

24-Month Contract

College graduate. Should have minimum five years experience in responsible supervisory positions in concrete laborctories including two years in charge of concrete laboratory on dam work. Experience desirable in concrete design, use of water reducing-retarder, air entraining and cooling agents. Must pass physical examination and security investigation.

- EXCELLENT SALARY
- OVERSEAS BONUS
- COMPLETION INCENTIVE
- EXTRA VACATION ALLOWANCE
- MEDICAL CARE & INSURANCE

Send complete resume, include all past employees' addresses and accurate salary information to

SVERDRUP & PARCEL ENGINEERING CO.
915 Olive St., St. Louis 1, Missouri

ENGINEERS

DEPUTY MANAGER

FOREIGN OPERATION

We are seeking an extremely competent licensed engineer, preferably civil, to serve as Deputy Manager of our large and varied Overseas Operations. This individual must have senior experience in management of diversified operations within the field of engineering planning, design and construction, and including estimating specifications, quality control, purchasing, etc. Several years of his experience should be as project manager in charge of overseas engineering projects. Additional requirement is experience in negotiation and client contact.

While the office will be located in Southern California travel to various overseas areas will be required from time to time. Individual may in the future, if necessary, go out as project manager on a major project.

Our need is immediate. U. S. Citizenship is required and we prefer age 35-50. Please submit a concise resume including previous and expected salaries.

P-3714, Engineering News-Record
1125 W. 6th St., Los Angeles 17, Calif.

SAFETY ENGINEER

Nationally known construction company requires services of graduate civil engineer with minimum of ten years of field and administrative work.

Must be able to establish and supervise operation of a sound safety program and have ability to sell employees on its value. C. E. degree requirement may be waived if substituted by a proven record in safety engineering for large General Contracting firms.

Send complete resume and salary requirements to:

P-3713, Engineering News-Record
Class Adv., Div., P.O. Box 12, N.Y. 36, N.Y.

STRUCTURAL STEEL SALES

Major steel fabricator needs two (2) men to estimate and sell structural steel in Midwest.
Excellent opportunity for qualified men. Good salary and other benefits.

P-3766, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

DRAFTING ROOM

STEEL CHECKER

Structural and Miscellaneous Steel Checker.
Minimum 5 Years Experience.
Opportunity for Advancement in Growing Concern for Right Man. Top Salary.
Rhode Island Area—Send Complete Resume to:

P. O. Box 1211 PROVIDENCE, R. I.

WANTED

ENGINEERING ASSOCIATES

SANITATION WATER SUPPLY
(foreign & domestic)
PETROLEUM (foreign)
GEOLOGICAL & MINING (foreign)
CHEMICAL & PETRO-CHEMICAL
(foreign and domestic)
WATER RESOURCES (foreign)
HYDRO-ELECTRIC (domestic & foreign)
CONSTRUCTION (domestic & foreign)
President and Vice-President levels.
Complete charge of your own division.
Drawing account against substantial share of Division profits before tax PLUS income from own secured investment.
Minimum Investment $25,000.00
GLOBAL Activity—TOP Recognition

Send complete resume including photo to:

P. O. Box 968,
Station "B", Montreal, Quebec

CIVIL ENGINEER

Permanent new position for graduate civil engineer in the salary range of $511 to $588 a month (plus longevity pay). Candidates with outstanding qualifications may be hired above the minimum. Vacation, sick leave, dual pension program, and other fringe benefits. Must be U.S. citizen and possess an EIT certificate. Some related experience desired to work in design and construction of sewer, water, street, sidewalks, and curbs. Travel expenses paid on invitation and moving expenses paid for selected candidate. Personnel Dept., 404 City-County Bldg., Madison 9, Wisconsin.

CONSTRUCTION MANAGER

Long established firm of engineers has opportunity for man to manage the construction of a large Chemical project.

Minimum of 15 years' experience on similar projects required.

Opportunity of continued employment.

Send complete resume and salary requirements to:

M-83, P. O. BOX 2045
PHILADELPHIA 3, PA.

"Put Yourself in the Other Fellow's Place"

TO EMPLOYERS
TO EMPLOYEES

Letters written offering Employment or applying for same are written with the hope of satisfying a current need. An answer, regardless of whether it is favorable or not, is usually expected.

MR. EMPLOYER, won't you remove the mystery about the status of an employee's application by acknowledging all applicants and not just the promising candidates.

MR. EMPLOYEE you, too, can help by acknowledging applications and job offers. This would encourage more companies to answer position wanted ads in this section.

We make this suggestion in a spirit of helpful cooperation between employers and employees.

This section will be the more useful to all as a result of this consideration.

Classified Advertising Division

McGRAW-HILL PUBLISHING CO., INC.
330 West 42nd St., New York 36, N. Y.

• POSITIONS WANTED
(Continued from page 121)

Executive—Contract Manager, Attorney, Administrator, 15 yrs Legal—Construction Experience, Govt Contracts, Claims, Employed. PW-3599, Engineering News-Record.

Project Manager, B.S.C.E., 16 yrs. exp., hvy. Const., Hwys., flood control, earthwork, bldgs., Govt. contracts, field & office. B. Eiswirth, P. O. Box 48 Clayton 5, Mo.

Construction Manager, graduate civil engineer, age 53, qualified for supervision all phases of heavy and industrial construction, last three years Federal projects of million dollar class, location preference southeast, available 60 days resume on request. PW-3745, Engineering News-Record.

Project Superintendent or General Superintendent capable of expediting complete project with twenty-two (22) years experience with; Superstructure, pre-cast, concrete, concrete, structural steel and all types of cantilever structures. I coordinate all subcontractors including mechanical and expect top pay and benefits, U.S. or O.S. Answer to, PW-3752, Engineering News-Record.

Construction Supt. Thoroughly familiar with all types of construction 20 years experience, 10 in supervisory capacity. Available immediately T. C. DaVania, 1513 Pershing, Salina, Kansas. TAylor 7-3922.

Civil Engineer, 35, ten years exp. in highway and airport construction specializing in asphalt paving. Capable of handling all phases of construction contracts. Desires to relocate in northeast. PW-3751, Engineering News-Record.

Project Manager-Superintendent, age 47, extensive Latin-American experience—Hydro. Structures, Chemical, Sewage, Water Supply, Housing, Mineral Plants, Crushing, Conveyors, Flotation, Diesel Electric Power, Fluent Spanish & Portuguese. PW-3756, Engineering News-Record.

Project Mgr.; Construction Supt. thoroughly capable of office and field organization. 30 years experience, heavy industrial, commercial, mass housing and government red tape. Available immediately. Herb Neyer, 1129 Cloud Circle, Salina, Kansas. TAylor 3-4113.

Construction Superintendent—25 years experience—Pumping Plants, Hydraulic Structures, Irrigation Projects, Highways, Equipment, Sub-Contracts, Planning etc. Investment considered. PW-3757, Engineering News-Record.

Construction Man, Age 39, 16 yrs. experience in contract negotiating, materials purchasing, and varied duties with firms engaged in gov't., School, church, hospital (public & private) buildings. Versed in bidding procedure and legal work. 9 years with top NYC firm. College grad. Consider relocate. Arthur R. Siegel, 167-10 Crocheron Ave., Flushing 58, N. Y. IN 3-0633.

Project Engineer—structural—over 30 years office and field exp. heavy constr. bridges, highways, hydraulic struct. commercial, industrial bldgs. Reg. PE NY. Desires position with Engineering org. or contractor in Greater NY area. PW-3749, Engineering News-Record.

Construction Engineer 27, A.A.S. degree 7 years exp. Gen. Const. available now. PW-3753, Engineering News-Record.

Equipment Superintendent or Master Mechanic. 20 years exp. All types earth moving, paving concrete & aggregate equipment. PW-3759, Engineering News-Record.

Ex-railway chief engr. (short-line), civil eng. background, desires position requiring initiative. Family man, age 37, pref. Northwest. Reg. in Minn. & Calif. Varied exp. incl. struct., design & admin. Presently emp. ($9500). Mark Nelson, 10504 SE 16th, Bellevue, Wn.

Man fluent in both English and Spanish, for Domestic or Foreign employment, with 22 years' operational experience on earthmoving and piledriving equipment, with Steam, Diesel and Gasoline engines, is available. Please write Forbes; 720 Cauldwell Ave., Bronx 55, N. Y., or call CYpress 2-8606.

Top notch engineer-estimator will estimate anything anywhere. Work out of Cleveland, Ohio or will relocate. Prepare complete bid, take off, price, solicit subs and sell job. Salary and commission. Graduate C.E., registered in Ohio. 20 years good experience heavy industrial and commercial construction. PW-3754, Engineering News-Record.

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The advertising rate is $25.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vest. on one col., 3 columns—30 in. to a page.

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$2.40 a line, min. 3 lines. To figure advance payment count 5 average words as a line.

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DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

CONSTRUCTION SUPERVISION

Exclusive Training Course by mail for top positions. Publishers Manual of Advanced Construction Management. Send postcard for details.

National Schools of Construction
Est. 1952
Satsuma, Florida

STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING
OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. Forty-eighth year.
Write today without obligation
WILSON Engineering Corp.
College House Offices HARVARD SQ., CAMBRIDGE, MASS.

ADDRESS BOX NO. REPLIES TO: Box No.
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Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

• CONTRACT WORK WANTED

Structural, Civil, Mechanical, Electrical Design and/or Drawing. Buildings, Bridges and all types of Structures. Professional Engineers. CWW-3636, Engineering News-Record.

• BUSINESS OPPORTUNITY

Oppt. addit. partner substantial Eastern N. Y. Struc., HVAC, san'try & survey practice, small investment. BO-3778, Engineering News-Record.

SEARCHLIGHT Equipment Locating Service

No Charge or Obligation

This service is aimed at helping you, the reader of "SEARCHLIGHT", to locate Surplus new and used Engineering and Construction equipment not currently advertised. (This service is for USER-BUYERS only).

How to use: Check the dealer ads to see if what you want is not currently advertised. If not, send us the specifications of the equipment wanted on the coupon below, or on your own company letterhead to:

Searchlight Section
Locating Service
c/o ENGINEERING NEWS-RECORD
P. O. Box 12, N. Y. 36, N. Y.

Your requirements will be brought promptly to the attention of the equipment dealers advertising in this section. You will receive replies directly from them.

Searchlight Equipment Locating Service
c/o ENGINEERING NEWS-RECORD
P.O. Box 12, N. Y. 36, N. Y.

Please help us locate the following equipment components.

.....

.....

NAME .....

TITLE .....

COMPANY .....

STREET .....

CITY 2/25/60

FOR SALE

MECHANICAL CONTRACTING COMPANY

Assets: Machinery, equipment, small tools. Now actively operating in six states in equipment erection, and industrial piping.

Cash requirements for purchase of Stock and sales price $35,000.00 and must assume $21,000.00 in notes payable to SBA and bank. Approximately $75,000.00 in assets involved.

This is an excellent opportunity to purchase an old established company with a long list of satisfied customers.

BO-3712, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

FOR RENT

MC-760 LORAIN MOTO-CRANE

65-Ton Capacity

Maximum Boom Length-170'
Plus 40' Jib

RENTAL EQUIPMENT CO.
5515 Bulwer Ave.
St. Louis, Mo.—*Evergreen 5-8775*

U. S. Army Telephones EE-8 fully reconditioned. Suitable for intercommunication between 2 or more points. $35.00 for 2 telephones, including 100 ft. of wire and batteries. Additional wire 1¢ per ft. or $25.00 per mile. Write for free list on telephones. All shipments F.O.B. Simpson, Pa.

TELEPHONE ENGINEERING CO.
Dept. ENR-2-60 Simpson, Pa.

WANTED

3-Drum Hoists

With or without swingers.
100 H P or larger. Gas, diesel or electric.
GEORGE K. BROWN
11901 Avenue O Chicago 17, Illinois

PILE DRIVING EQUIPMENT

VULCAN AND McKIERNAN-TERRY
Steam Pile Hammers and Extractors

• DROP HAMMERS • DRIVING CAPS • HOISTS AND BOILERS
• STEEL LEADS • PILE DRIVER HOSE • STEEL SHEET PILING

CONMACO, INC.
DRexel 1-3930
820A KANSAS AVE.,
KANSAS CITY, KANS.

FOR SALE

1—Used Lima Model 1201, New Cummins Engine and Undercarriage Rebuilt in 1958
1—Used Garwood Buckeye Trencher Model 407. New in 1958
1—Used Manitowoc 3900
1—Used Manitowoc 3500

MANITOWOC-FORSYTHE CORPORATION
37-11 Vernon Blvd.—EXeter 2-6125
Long Island City 1, New York

EUCLID SCRAPERS

S-7, S-12, S-18, SS-18
Also 6 wheel, 15½ yd. 8TDT and 14TDT Scrapers. All excellent condition—some new tires.

Subject to prior sale or disposition.

L. B. SMITH, INC.
357 W. Fayette St. Syracuse, N. Y.
Phone: GR 5-2196

FOR SALE

48B Bucyrus Erie Shovel, diesel 2½ c.y.
3540' 9" x 9" road forms
1800' 11" x 19" airport forms
2500' 16" x 12" airport forms

WILLIAMS CONSTRUCTION COMPANY
Box 5045 Balto. 20, Md. Murdock 6-1000

Four Bucyrus-Erie 54-B SHOVELS

#51079, 60317, 107758, 107761

THE W. I. CLARK COMPANY
2195 Dixwell Ave. Hamden, Conn.
Phone CH 8-2131

PUMPCRETE

Current Models Sale or Rent
Engineering Service & Parts
R. T. SHERROD
Concrete Equipment Company
Jones Island, Milwaukee 7, Wis.

EIMCO
Model 105, Excavator

Complete with Cummins Engine, 1-¾ Yard Rehandling Bucket, 1-½ Cubic Yard Pointed-lip Rock Bucket "A-1" Condition. Price: $16,000.00

J. W. BURRESS, INC.
P. O. Box 4266 Phone: PArk 3-5544
Winston-Salem, North Carolina

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SURPLUS NEW and USED For Sale, Wanted or Rent

We do a Nation-wide business in

STEEL SHEET PILING

IMMEDIATE SHIPMENT

815 pcs. 75 to 30 ft. Beth. SP-6a—New York
100 pcs. 62 ft. Beth. ZP-32—Connecticut
103 pcs. 60 ft. MZ-22—Tennessee
150 pcs. 60 ft. SP-4—W. Virginia
290 pcs. 60 to 30 ft. M-16 & M-115—Tennessee
370 pcs. 60 to 30 ft. M-115 & M-116—Indiana
150 pcs. 34-30 ft. M-116—Michigan
81 pcs. 25 ft. M-115—Mississippi
220 pcs. 15 ft. M-115—Missouri
Other lengths and sections at various locations. Storage yards at CHICAGO, BUFFALO & MEMPHIS.
Also 10" x 42# and 12" x 53# BP 60' in stock.

PILE DRIVING EQUIPMENT

VULCAN AND McKIERNAN-TERRY
PILE HAMMERS & EXTRACTORS
All Sizes—For Rent & Sale—Immediate Shipment

MISSISSIPPI VALLEY EQUIPMENT CO.
1908 Railway Exchange Bldg.
St. Louis 1, Mo. CHestnut 1-4474

PILING IN SOUTH

200 pcs. 10 in. 42 lb. 12 in. 53 lb. 60' BP
900 pcs. M115, M116, DP2, 12' to 60'
E4 Extractor & B3 Hammer
Stocks Jax—Miami—New Orleans—Tampa

THE SEABOARD STEEL CORP.
Tel. Ringling 7-0461 P. O. Box 5071 Sarasota, Fla.

H & SHEET STEEL PILING

3700 PCS. BETH. SP6A, 50' 56' & 48' & 40' & 35'
1900 PCS. MP112—12', 25', 35', 40', & 60'
850 PCS. —BETH.—AP3 20', 25', 30', 35', & 60'
790 PCS. BETH.—DP2—31', 35', 40', 50', 60'
1200 PCS. ZP38-ZP32—25', 36', 50', 60' & 65'
1300 PCS. BP10 BP12—BP 14—55' to 60'
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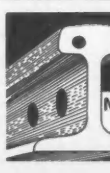

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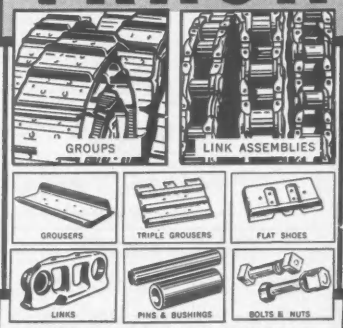

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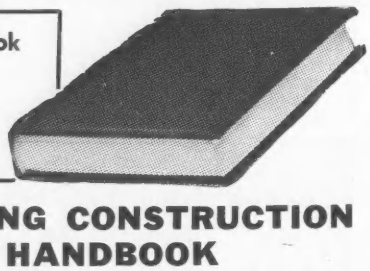

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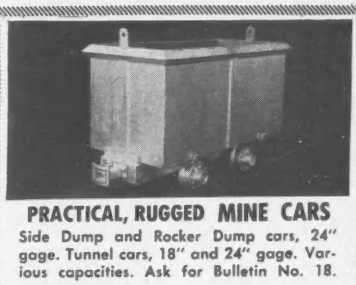

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Editorials

The Future Civil Engineer

THE FRAGMENTATION OF ENGINEERING into a mounting number of specialties can place the civil engineer in a more commanding position in the future than he has ever enjoyed in the past.

This view is not as widely held as it might be, probably because quite a few of the new branches of engineering seem to have been whittled off the basic civil engineering tree. Furthermore, in many cases, the new branches have developed into exciting fields of endeavor, vying with civil engineering in attractiveness to young people choosing a profession.

To regard such a situation with pessimism, however, is shortsighted. Civil engineering today is less a shriveling trunk stripped of all but a few ill-assorted branches than it is a very live tree freely giving off new branches that must remain attached to the trunk in order to grow and flourish. Thus the modern civil engineer, in addition to his classical duties, is in a good position to act as coordinator of the many engineering specialties that must be meshed in creating such modern facilities as oil refineries, chemical plants, nuclear power stations and even space vehicles.

Nor is this by any means a new concept. It has, for example, been practiced for years in that branch which is sanitary engineering, where the civil engineer has coordinated the work of electrical, mechanical and chemical engineers while exercising his own talents in the fields of foundations, structures, hydraulics and construction supervision. What is needed is merely an extension of this practice to the whole range of new facilities that modern technology makes it possible to create. Principally the need is for a widened perspective and the will for the wider knowledge required to grasp the opportunities that would thus be visible.

Obviously, a key figure in developing this wider perspective is the civil engineering educator, and fortunately there is increasing evidence that curricula and teaching methods are beginning to reflect an awareness of the problem. An outstanding example is the University of Arizona where a new program of graduate study has been instituted leading to the doctor of philosophy degree in civil engineering. In attaining such a degree, even though work will be focused on one of the classic specialties of civil engineering, corollary attention will be given to such fields as chemistry, mechanical engineering, nuclear engineering, physics, numerical analysis and the like.

As Prof. Gene M. Nordby, head of the Department of Civil Engineering points out, "With the coming of the space age, the entire field of engineering is evolving so rapidly, and areas of application have grown so diverse that the traditional boundaries between the various areas of engineering tend to become blurred. Because civil engineering is an old, established field the fact that it can become a major participant in these modern developments is often overlooked."

Implementation of this philosophy at the University of Arizona is meeting with considerable success, judged by the fact that its Department of Civil Engineering was the only one in the nation to receive any of the 81 National Defense Scholarships for engineering students studying for Ph.D's. The Department received five.

Professor Nordby's main objective is to encourage civil engineering students to prepare themselves for positions in engineering education and in research. But the philosophy of broadening knowledge beyond the classical borders of civil engineering and thus widening perspective is also worthy of adoption outside of college halls. Today's civil engineer has need to put such a philosophy into practice if he is to be prepared to exert the coordinating leadership that continued fragmentation of engineering into specialties requires. The alternative is to let the leadership go by default.

New Techniques With Steel

SO MUCH EXCELLENT EXPERIENCE has been gained in the last decade in welding, use of high-strength alloy steels, composite construction, continuity and plastic design that these new practices in the use of structural steel deserve a more favorable reception.

Two excuses are commonly given for not trying these new materials and techniques. One is that they have not been in use long enough to insure safety and durability; the other is that comparative cost estimates are unfavorable. The first excuse is not valid for the materials and techniques mentioned above, because they all have been thoroughly tested. The second is legitimate, but may be due to poor estimating.

For example, the experiences of the California Division of Highways with welded, alloy-steel bridges (ENR Feb. 18, p. 52) points up the danger of basing design estimates on basic material unit prices without equal accuracy in estimating fabrication and erection costs. Cost studies show that while the base price of steel goes up at about the same rate as strength, bid prices go down.

Many engineers also believe that for short spans—perhaps 30 to 150 ft—rolled beams are more economical than plate girders. Yet, in California, extensive use is made of builtup members in both building and bridge construction, because experience shows them to be cheaper. Designers cut material requirements to a minimum by welding, putting the material where it does the most good (thin webs, thick flanges), tapering the members or using high-strength steels and taking advantage of continuity. Volume production permits a reduction in fabricating costs.

Designers everywhere might well examine these techniques in the light of truly realistic cost estimates. They, too, might find them advantageous.

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